Assessment of Dam Safety
Coal Combustion Surface Impoundments (Task 3)
Draft Report

Dayton Power & Light Company

JM Stuart Station

Aberdeen, OH

Prepared for

Lockheed Martin

2890 Woodridge Ave #209
Edison, New Jersey 08837

December 18, 2009

CHA Project No. 20085.1030.1510

CHA

I acknowledge that the management units referenced herein:

- Ash Pond No. 3A,
- Ash Pond No. 5,
- Ash Pond No. 6,
- Ash Pond No. 7/7A, and
- Ash Pond No. 10.

Have been assessed on October 27, 2009 and October 28, 2009

Signature: _____

Malcolm D. Hargraves, P.E.
Senior Geotechnical Engineer
Registered in the State of Ohio

Reviewer: _____

Warren A. Harris, P.E.
Geotechnical Operations Manager

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1.0 INTRODUCTION & PROJECT DESCRIPTION

1.1 Introduction

CHA was contracted by Lockheed Martin (a contractor to the United States Environmental Protection Agency) to perform site assessments of selected coal combustion surface impoundments (Project #0-381 Coal Combustion Surface Impoundments/Dam Safety Inspections). As part of this contract, CHA was assigned to perform a site assessment of Dayton Power and Light Company's (DPL) Coal Combustion Waste (CCW) impoundments at the JM Stuart Station, located in Aberdeen, Adams County, Ohio as shown on Figure 1 – Project Location Map.

CHA made a site visit on October 27, 2009 and October 28, 2009 to inventory coal combustion waste surface impoundments at the facility, perform visual observations of the containment dikes, and collect relevant information regarding the site assessment.

CHA Engineers Malcolm Hargraves, P.E. and Rebecca M. Filkins were accompanied by the following individuals:

Company or Organization	**Name and Title**
Craig Spangler	J.M. Stuart Station Material Handling Manager
John Hendrix	J.M. Stuart Station Engineer
Scott Arentsen	DP&L Environmental Manager
Mark Guerriero	J.M. Stuart Station Manager
Troy Williams	J.M. Stuart Station EHS Manager
Harry McCann	J.M. Stuart Station Environmental
Keith Banachowski (10/27/09)	ODNR – Division of Soil and Water Resources
Jim Huitger (10/28/09)	ODNR – Division of Soil and Water Resources

1.2 Project Background

The Ash Ponds are under the jurisdiction of the Ohio Department of Natural Resources (ODNR) Division of Water – Dam Safety Program. Table 1 provides the ODNR and National Inventory of Dams (NID) identification numbers.

Table 1 – Impoundment Identification Numbers

Impoundment	ODNR ID	NID ID
Ash Pond 3A	8535-012	Not listed
Ash Pond 5	8535-003	Not listed
Ash Pond 6	8535-013	Not listed
Ash Pond 7	8535-002	Not listed
Ash Pond 10	8535-011	OH03030

Ash Ponds 3A, 5, 6, and 7 recently came under the jurisdiction of the ODNR. As of the date of this letter, NID identification numbers have not been issued.

The ash ponds have been classified by ODNR as hazard Class II Dams (ODNR Dam Inventory Sheets provided with their November 5, 2009 letter). The ODNR defines a Class II dam as one that should a sudden failure occur it would result in at least one of the following conditions, but loss of human life is not probable.

a. Disruption of a public water supply or wastewater treatment facility, release of health hazardous industrial or commercial waste, or other health hazards.
b. Flooding of residential, commercial, industrial, or publicly owned structures.
c. Flooding of high-value property.
d. Damage or disruption to major roads including but not limited to interstate and state highways, and the only access to residential or other critical areas such as hospitals, nursing homes, or correctional facilities as determined by the chief.
e. Damage or disruption to railroads or public utilities.

f. Damage to downstream Class I, II or III dams or levees, or other dams or levees of high value. Damage to dams or levees can include, but is not limited to, overtopping of the structure.

1.2.1 State Issued Permits

Ohio State Permit No. 0IB00049*ND (EPA NPDES permit No. OH0004316) has been issued to Dayton Power and Light Company authorizing discharge under the National Pollutant Discharge Elimination System (NPDES) to the Buzzard's Roost Creek, Little Threemile Creek, and the Ohio River in accordance with effluent limitations, monitoring requirements and other conditions set forth in the permit. The permit is proposed to expire on July 31, 2012.

The Ohio EPA has also issued a Permit-to-Install (PTI) No. 06-7028 on April 7, 2003 for Landfill 11 which is constructed above the former Pond 8. Two PTI numbers were also issued for expansions to Landfill 9. PTI No. 06-1452 was issued October 10, 1986 for the first of two expansions and PIT No. 06-4248 was issued February 8, 1995 for the second expansion. An original PTI was reportedly issued in 1984, but a permit number was not available.

1.3 Site Description and Location

JM Stuart Station is located along the northern bank of the Ohio River in Adams County, Ohio, north of the town of Springdale, Ohio. The plant currently has five ponds (Ash Ponds 3A, 5, 6, 7/7A, and 10) and two active landfill disposal areas (Landfill 9 and 11) for the coal combustion waste products (CCW) generated at the plant. Figure 2 – Photo Site Plan shows the location of the Ash Ponds and Landfills. The Ash Ponds are located within 0.5 miles of the Ohio River and are described in more detail in Sections 1.3.1 through 1.3.4.

Several of the drawings provided by DP&L indicated that the normal water level in the Ohio River is controlled by the Captain Anthony Meldahl Locks & Dam at El. 485.0

An aerial photograph of the region indicating the location of the JM Stuart Station and identifying schools, hospitals, or other critical infrastructure located within approximately five miles down gradient of the ash ponds is provided as Figure 3 – Critical Infrastructure Map.

1.3.1 Ash Pond 3A

According to the 1976 drawing provided by DPL, we understand that the southern portion of Ash Pond 3A was constructed above the former ash disposal area. Figures 4A and 4B show the plan view and selected sections from the 1976 drawing. The ODNR Dam Inventory Sheet (DIS) reports that the dikes were designed by DP&L with Bowser-Morner. Construction was reportedly completed in 1978. This impoundment receives fly ash from the plant.

Ash Pond 3A is entirely bounded by earth dikes with a total length of approximately 4,400 ft and a maximum height of approximately 28 feet. The width of the dike crests are 12 feet. The crest of the north dike (which also functions as a portion of the southern dike and buttress for the former Pond 8 and current Landfill 11) is at El. 570. The crest of the east and west dikes slopes downward from El. 570 at the north end to abut the northern dike El. 558.0 at the south end, and remains at that elevation along the south dike crest. The upstream and downstream embankments have slopes of 2.5 horizontal to 1 vertical (2.5H:1V). A 40 ft wide by 3 ft high sand drain is shown below the downstream toe. Section A-A, shown herein on Figure 4B, indicates that a potion of the embankment was constructed over an existing clay cover. A 20-foot-wide bench is indicated in Section D-D, shown herein on Figure 4B, along the northern dike; it is assumed that this is the transition between the cut and fill portions of the slope.

Fly ash and water enters Ash Pond 3A through the sluice pipe on the southwestern corner of the pond. The surface area of the pond is approximately 50 acres and the maximum operating pond elevation, based upon an ODNR regulated minimum 5-foot operating freeboard is at 553 feet. The Ohio DIS indicates that the elevation at the top of the concrete spillway structure is at El. 554. Water entering the intake structure is discharged into a channel at the northwestern

corner of Pond 6, where it conveys water into Pond 6. At the time of CHA's site visit, ash was not being actively sluiced into the pond and the water level in the pond was significantly below the spillway, and ash was being excavated for landfilling.

1.3.2 Fly Ash Pond 5

It appears that the 1968 drawing provided by DPL, is a grading plan for Ash Pond 5A. Figures 5A and 5B show the plan view and selected sections from the 1968 drawing. The ODNR Dam Inventory sheet reports that the dikes were designed by DP&L. DP&L reported to the EPA that pond was commissioned circa 1975. This impoundment receives bottom ash, cooling tower & FGD blow-down, and miscellaneous plant waste water.

Ash Pond 5 is entirely bounded by earth dikes with a total length of approximately 4200 feet and a maximum height of approximately 41 feet. The width of the dike crests are 22 feet. A discrepancy was noted between the top of dike elevation shown on the 1968 drawing (El. 532.0) and the crest elevation reported on the Ohio Dam Inventory Sheet (El. 529). The upstream side of the embankment slopes at 2.2H:1V and downstream side of the embankment has a slope of 3H:1V as shown on Sections A-A, B-B, and D-D included herein in Figure 5B.

Material enters Ash Pond 5 through a series of pipes and interior channels along the east side of the pond. An interior dike has been constructed to facilitate ash and waste settling in the eastern third of the pond, forming an ash delta and processing area and creating an open pond in the remaining pond area. The maximum pond elevation, based on the Ohio DIS and assuming a 5-foot freeboard is maintained as required by ODNR, is 524 feet. The surface area of the pond is approximately 34 acres and has a maximum capacity of 2,300,000 cy. A concrete drop inlet structure with metal sheeting and skimmer forms the outlet for the pond and is currently set at approximately El. 522. Water entering the intake structure is discharged into the water treatment plant.

1.3.3 Fly Ash Ponds 6 and 7/7A

The 1972 drawing provided by DPL shows grading and dike cross section information for Ponds 6 and 7. Figures 6A and 6B show the plan view and sections from the 1972 drawing. DP&L reported to the EPA that Ponds 6 and 7 were constructed c. 1977 and Pond 7A was constructed c. 1977. Pond 6 receives ash pond discharge and ash landfill storm water. Pond 7 receives fly ash and Pond 7A is utilized for final polishing.

Table 2 provides a summary of the pond configuration information for Ponds 6 and 7/7A.

Table 2 – Ponds 6 and 7/7A

Ash Pond	Dike Length (feet)	Maximum Height (feet)	Area (acres)	Storage Capacity (CY)
6	3400	31.5	37	2,500,000
7	3150	33.5	37	2,500,000
7A			3	61,900

The northern side of Ash Pond 6 is incised. The western side of Ponds 6 and 7A is bounded by an earth dike with a 16-foot-wide crest at El. 533.5. The southern side of Ponds 7A and 7 is bounded by an earth dike with a 16 foot-wide crest at El. 531.5. It is unclear from the drawings if the western side of Ponds 7 and 6 is incised or bounded by a earth dike, however, based upon the physical site assessment, it appears as if this area is partially incised with a constructed dike upon which a gravel access drive and the eastern dike of Pond 3A has been founded The upstream slope on the western side of Ponds 7 and 6 and the crest rises from El. 531.5 on the southern end to El. 533.5 on the northern end. According to the plans, the divider dike between Ash Ponds 6 and 7 is an earth dike 16 foot-wide crest at El. 531.5. Measurements taken in the field indicate that the crest width is on the order of 60 feet as a result of grading activities over time. The 1972 drawing shows 3H:1V slopes on the upstream and downstream side of the dikes.

The Ohio DIS indicates that the upstream and downstream slopes at Ash Ponds 6 and 7 is at 2H:1V. Information on the divider dike between Ash Ponds 7 and 7A has not been provided.

Sluiced ash material enters the southwest corner of Pond 7 via HDPE sluice lines when Pond 7 is actively receiving waste ash. Decanted water from Pond 3A (when Pond 3A is actively receiving ash) enters the northwest corner of Pond 6 via the discharge channel as described previously. Pond 6 also receives decanted water from Pond 7 via a CMP culvert beneath the access drive separating the two pond areas. The outlet works for Pond 6 consists of a concrete open channel sluiceway that conveys decanted water to a treatment and sampling structure at the northeast corner of the pond. From that point, water discharges beneath the eastern dike to Pond 7A for final decanting or "polishing" before entering another concrete drop inlet sluiceway and final discharge to the Ohio River.

1.3.4 Ash Pond 10

CHA has not received information from DP&L regarding design and construction of Ash Pond 10. The 2008 ODNR Inspection Report indicates that the Pond 10 embankments were constructed of non-cohesive materials with a clay liner on the interior slope.

1.3.5 Other Impoundments

Other impoundments at the JM Stuart Station include a wastewater and acid washdown basin adjacent to the treatment facility next to Pond 5 and an incised stormwater basin adjacent to Landfill No. 9. These basins do not store or process sluiced coal combustion waste.

1.4 Previously Identified Safety Issues

Based on our review of the information provided to CHA and as reported by DP&L there have been no identified safety issues related to dike stability or excessive seepage at Ash Pond 10. A safety inspection program has not been in place for Ponds 3A, 5, 6, and 7/7A.

1.5 Site Geology

Based on a review of available surficial geology map (Geologic map of the Maysville East quadrangle, Ohio-Kentucky, USGS GQ-1006, 1972), the predominate soil type at the site is likely to consist of glacial outwash deposits of sand, gravel, silt and clay. The surficial geology map is shown on Figure 7. Adjacent to the Ohio River and Little Threemile River, alluvial deposits of silt, sand, and clay are indicated. The bedrock geology map (Bedrock geology of the Maysville East, Ky.-Ohio Quadrangle, Ohio Division of Geological Survey, Open-File Map) indicates that Ordovician aged planar-bedded shale and limestone of the Kope Formation likely lies below these materials

1.6 Bibliography

CHA reviewed the following documents provided by AEP in preparing this report:

- *Site General Grading – SH 1*, drawing sheet 300-12-1020, prepared by Ebasco Services Incorporated, New York, dated June 1, 1966.
- *Site General Grading – SH 3*, drawing sheet 300-12-1022, prepared by Ebasco Services Incorporated, New York, dated June 1, 1966.
- *Site General Grading – SH 4*, drawing sheet 300-12-1023, prepared by Ebasco Services Incorporated, New York, dated June 1, 1966.
- *Ash Pond Plan*, drawing sheet 300-13-1143, prepared by Ebasco Services Incorporated, New York, dated January 9, 1969.
- *Site General Grading – SH 1 (continued*, drawing sheet 300-12-1020A, prepared by Ebasco Services Incorporated, New York, dated May 9, 1972.
- *Plan & Sections Ash Pits 3A & 8*, drawing sheet 300-12-1020B, prepared by The Dayton Power and Light Company, December 16, 1976.
- *Inlet & Outlet Structures & Details, Ash Pits 3A & 8*, drawing sheet 300-12-1020C, prepared by The Dayton Power and Light Company, July 11, 1977.

- ODNR Dam Safety Inspection Report, JM Stuart Ash Pond 10 Dam, June 12, 2008.
- *Request for Information Under Section 104(e) of the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C 960(e)*, Letter dated March 26, 2009 from Dayton Power & Light Company to the U.S. Environmental Protection Agency.
- *Dams Impounding Ash Ponds at the JM Stuart Station, Adams County.* Letter dated November 5, 2009 from Ohio Department of Natural Resources to Dayton Power & Light Company.

N	CHA	**Figure 1** **Project Location Map**
	Scale: 1" = 1 mile	**Project No.:** **20085.1030.1510**
		Dayton Power **JM Stuart Station** **Aberdeen, OH**

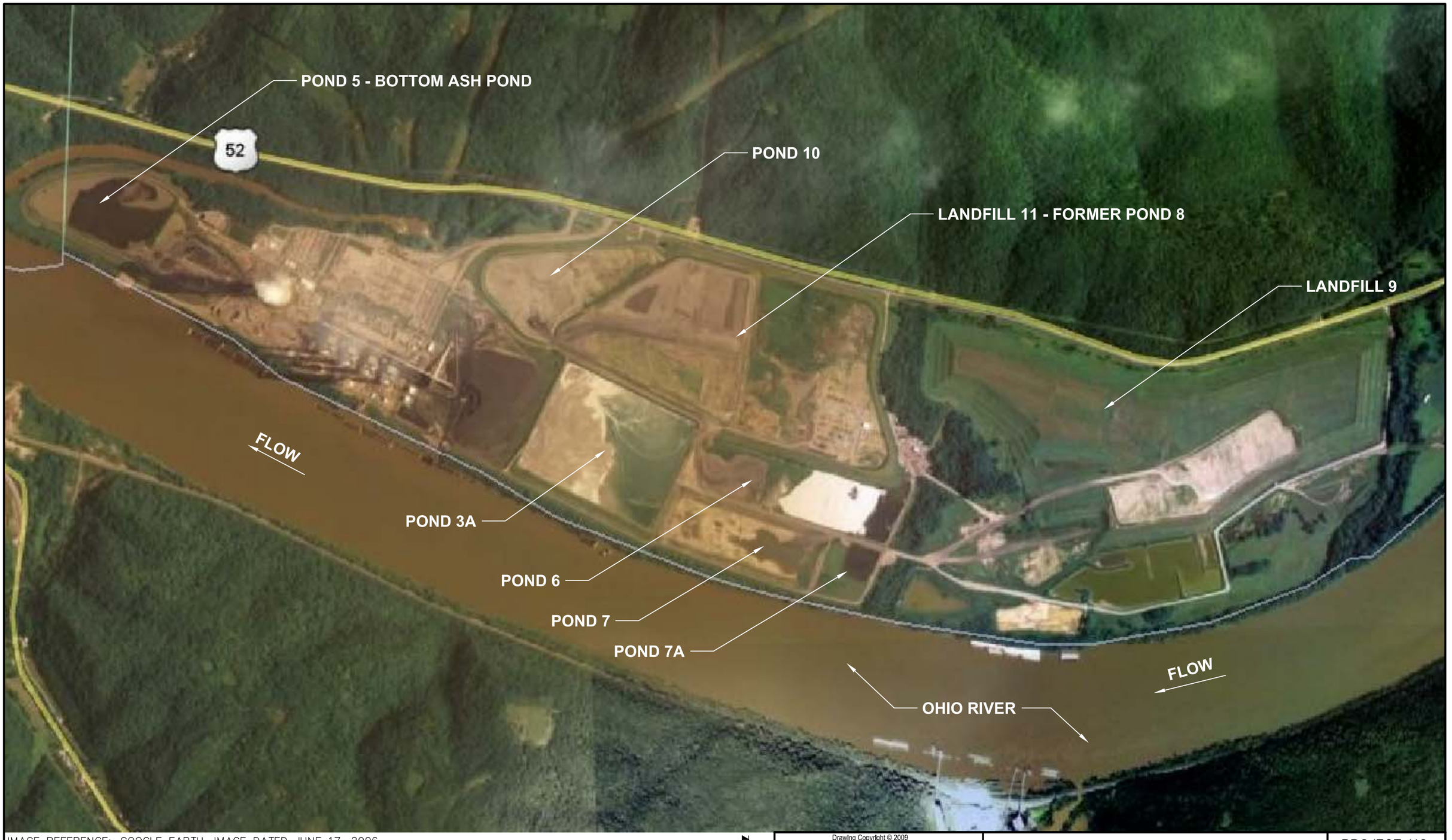

IMAGE REFERENCE: GOOGLE EARTH, IMAGE DATED JUNE 17, 2006.

0 1020 2040

Scale in feet

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PHOTO SITE PLAN

JM STUART STATION
ABERDEEN, OHIO

PROJECT NO. 20085.1030

DATE: 12/2009

FIGURE 2

IMAGE REFERENCE: GOOGLE EARTH, IMAGE DATED JUNE 17, 2006.

LEGEND

11 STREET, HIGHWAY

FIRE DEPARTMENT

CHURCH

SCHOOL

N

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CRITICAL INFRASTRUCTURE MAP

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FIGURE 3

Pit 8

MAIN PLANT RD.

CONSTRUCTION RD.

East-West Baseline

DETAIL "C"
SEE DWG. #300-12-1020C

30' WIDE RAMP RD

P.I. S240.0' W88.0'

Top Of Dike Elev. 570.0'

Ramp Down 12% GRADE

ASH PIPES 587.0'

Pit 3A

SEE DWG. #300-12-1020C

SERVICE ROAD ASH PIPES

P.I. S240± W775±

Top Dike EL. 558.00'

ASH PIPES

DETAIL "B"
SEE DWG. #300-12-1020C

Toe Of Slope Elev. 530.0'

Top of Dike - Elev. 531.5'

℄ EL. ASH PIPES EL. 534.0'

P.I. S.1638.0' W.1800.0'

P.I. S.1632.0' W. 88.0'

Normal Pool Elev. 488.0'

OHIO RIVER

OUTFALL EL. 504.0' INV EL 540.0'

Top Of Slope @ Nat. Grade

INVERT EL. 533.0'

M.H.#3

M.H.#2

M.H.#1

SEE DWG. #300-12-1020C

P.I. S.345.0' E.6.0'

H.P. 435.0'

Pit #6 Slope

P.I. N 140± E 2210±

Ramp Down EL 570.0' TO 531.5' 10% GRADE

P.I. N 70.0' E 2420.0'

EL. 570.0

Inv. EL. 528.0'

Inv. @ Nat. Grade

30% Slope

8'-0"

16'-0"

P.I. Skimmer #1 S. 814.0' E. 2388.5' Inv. El. 521.0' LP 420.0'

36" Lined CMP

P.I. Skimmer #2 S. 732.0' E. 1850.0' Inv. El. 521.0'

Top Of Dike Elev. 533.5'

P.I. S.1021.0' E. 6.0'

Toe Of Slope

2% Slope

Pit #7 Slope

End Of Pipe S. 566.0' E. 2392.5' Inv. 513.0'

LP 430.0'

P.I. S.1515.0' E.1600.0'

P.I. S.1705.0' E.0.0'

Top of Dike - Elev. 531.5'

P.I. S. 646.0' E. 2420.0'

P.I. S.1330.0' E.2420.0'

Flange Of Pipe S. 1009.0' E. 2392.5' Inv. 517.0'

P.I. Headwall S. 1458.0' E. 2350.0' Inv. El. 489.5

2% Slope

PLAN
SCALE 1" = 200'

Section C-C

6" Crushed Stone Road

12'

Elev. 570'

Slope 2.5:1

Sand Drain

Existing G

0 1020 2040
Scale in feet

N

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RECORD DRAWING FOR ASH POND 3A – PLAN VIEW

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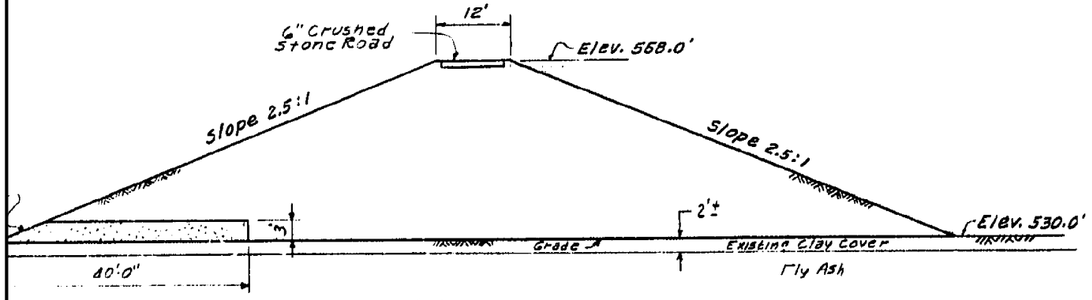
ABERDEEN, OHIO

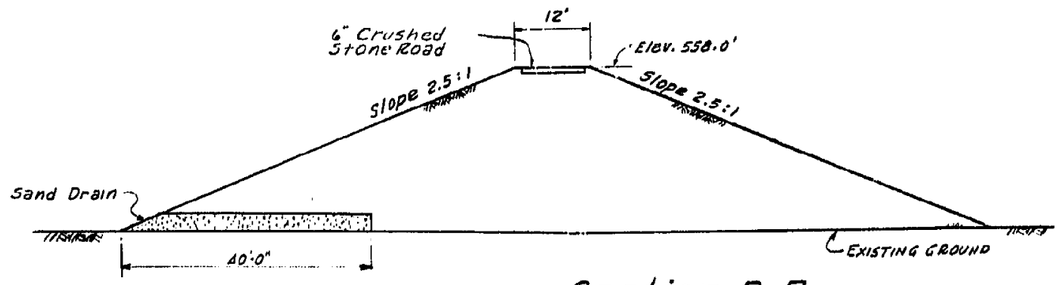
PROJECT NO. 20085.1030

DATE: 12/2009

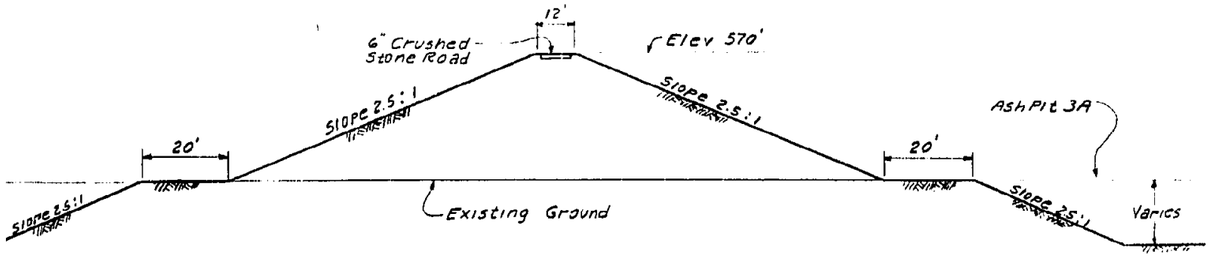
FIGURE 4A



Section A-A



Section B-B



Section D-D

0 1020 2040
Scale in feet

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RECORD DRAWING FOR ASH POND 3A – SECTIONS

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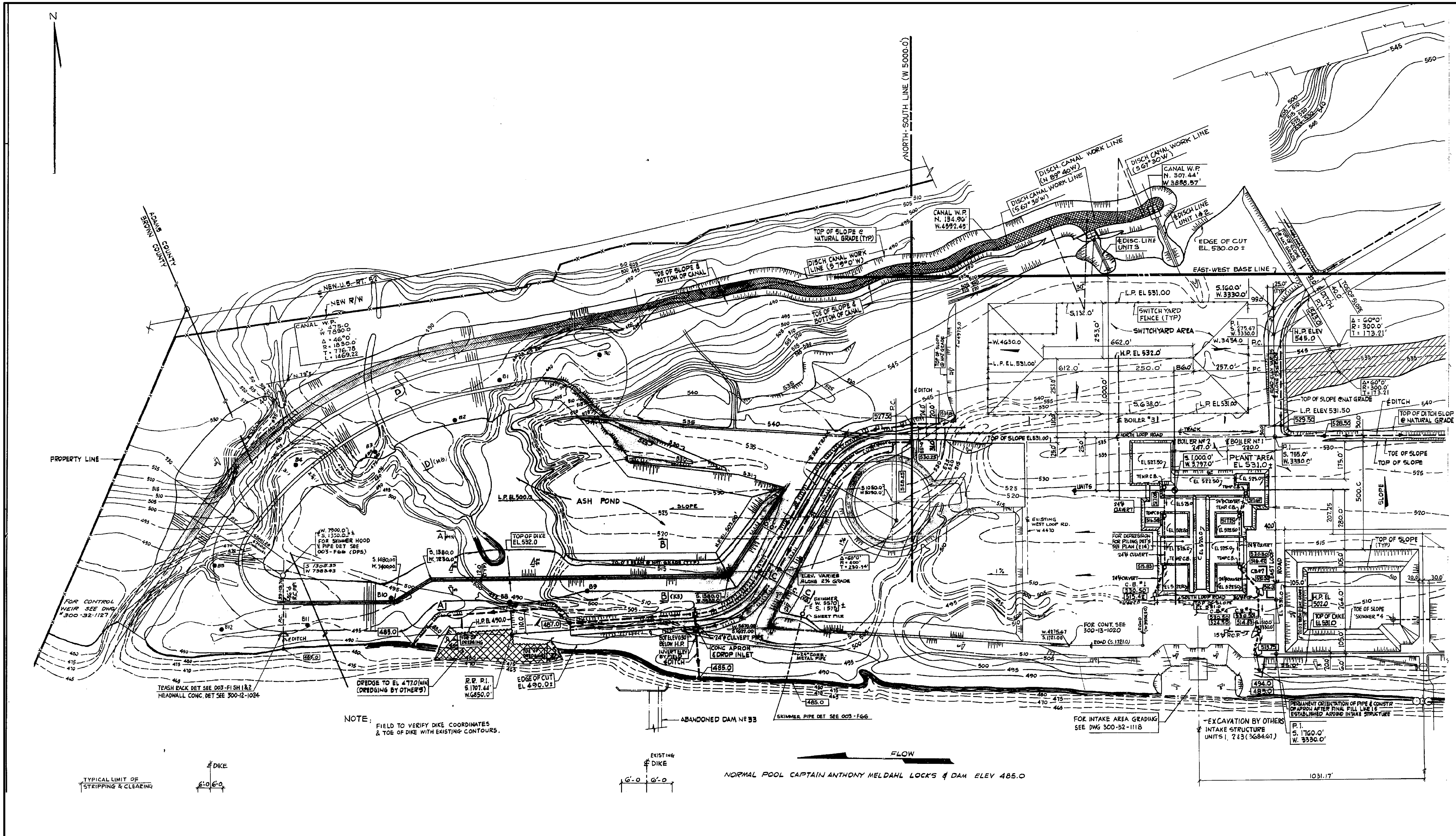
FIGURE 4B



0 1020 2040

Scale in feet

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RECORD DRAWING FOR ASH POND 5 – PLAN VIEW

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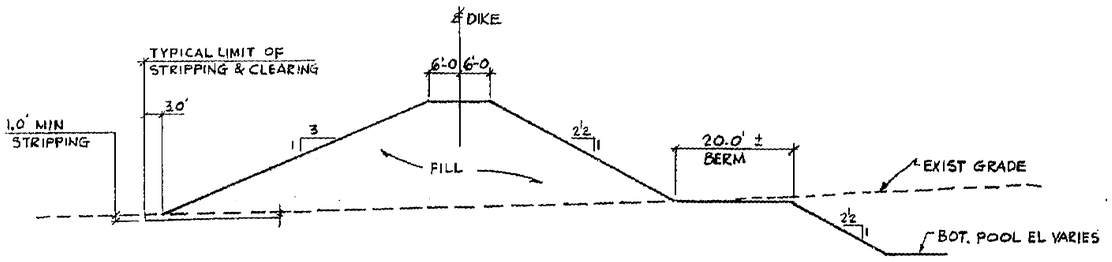
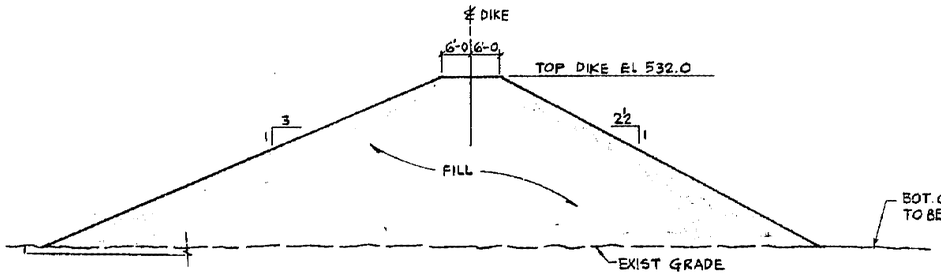
FIGURE 5A

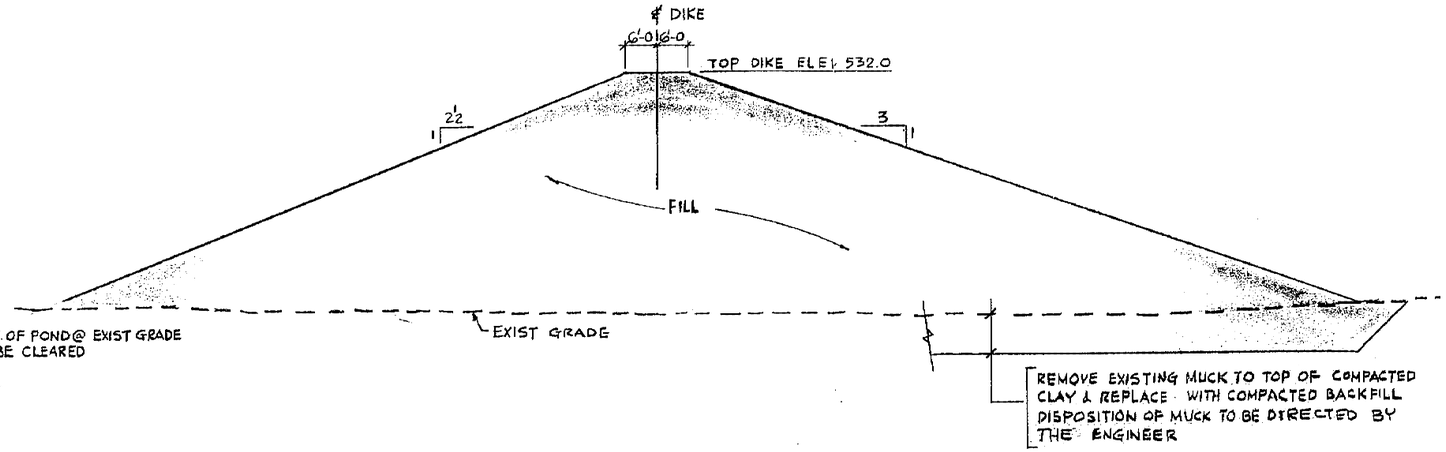


SECT B-B (H8)
1"= 20'-0



FOR NOTES REGARDING SOFT MATERIAL AT EXIST GRADE SEE SECT D-D(M9)

SECT. A-A (G5)
1"= 20'-0



SECT D-D (G5)
1" = 20'-0

0 1020 2040
Scale in feet

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RECORD DRAWING FOR ASH POND 5 – SECTIONS

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FIGURE 5B

NORTH-SOUTH BASE LINE
(TRUE BEARING N 2° 39' 53" E
(NC STATE GRID N 2° 50' 39" E)

T-WEST BASE LINE

P.I. S.345.0' E.6.0'

P.I. N.29.0' E.3420.0'

FILL AREA

INV. ELEV. 328.0' INV. @ NAT. GRADE

℄ DITCH WIDTH VARIES TO 30' SLOPE TO DRAIN

TOP OF SLOPE @ NAT. GRADE

EL. 533.5'

PIT #6

SLOPE

WATER ELEV. 530.0'
3'-6" FREE BOARD
≈ 1,650,000 CU. YD.

H.P. 495.0'

P.I. SKIMMER #1
S.314.0'
E.2389.4'
INV. EL. 521.0'

LR 420.0'

36" LINED CMP.

TOP OF DIKE ELEV. 533.5'

P.I. SKIMMER #2
S.728.0'
E.1850.0'
INV. EL. 521.0'

CUT-OFF WALL (9' SQUARE DIAPHRAGM AROUND 36"ø PIPE)

P.I. S.1021.0' E.6.0'

TOP OF DIKE - ELEV. 533.5'

P.I. S.646.0' E.2420.0'

LOCATION OF CONSTRUCTION RD. BY FIELD.

TOE OF SLOPE

PIT #7

SLOPE

WATER ELEV. 528.0'
3'-6" FREE BOARD
≈ 1,700,000 CU. YD.

H.P. 495.0'

@ END OF PIPE
S. 366.0
E. 2936.5'
INV. 370.0'

@ FLANGE OF PIPE
S. 1009.0'
E. 2172.5'
INV. 377.0'

LR 450.0

TOP OF DIKE ELEV. 531.5'

P.I. S.1515.0' E.1600.0'

P.I. S.1380.0' E.2420.0'

P.I. S.370.0' E.3825.0'

P.I. S.1085.0' E.3440.0'

P.I. S.1285.0' E.2740.0'

P.I. S.685.0' E.4505.0'

TOP OF SLOPE-ELEV. 528.0'

TOE OF SLOPE @ NAT. GRADE

P.I. S.415.0' E.5000.0'

FILL AREA

P.I. N.140.0' E.5840.0'

P.I. - HEADWALL
S.1458.0'
E.2350.0'
INV. EL. 493.5

STONE PROTECTION

CUT-OFF WALL (10' SQUARE DIAPHRAGM AROUND 54" DIA. PIPE)
(WAS NOT INSTALLED)

16'
12'
6" OF #411 CRUSHED STONE

TYPICAL SECTION OF ROAD
DETAIL ON TOP OF ALL DIKES
N.T.S.

0 1020 2040
Scale in feet

N

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RECORD DRAWINGS FOR ASH PONDS 6 7 AND 7A – PLAN VIEW

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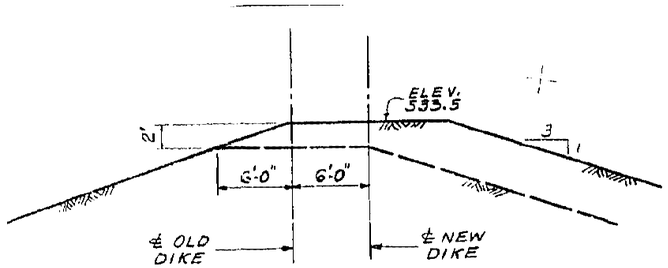
PROJECT NO. 20085.1030

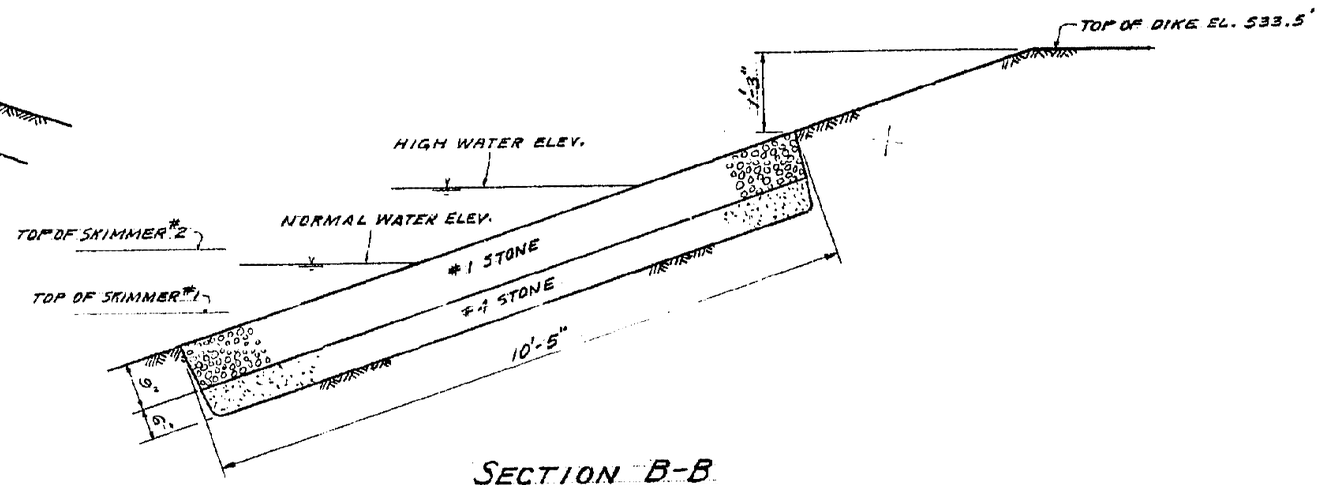
DATE: 12/2009

FIGURE 6A



SECTION A-A

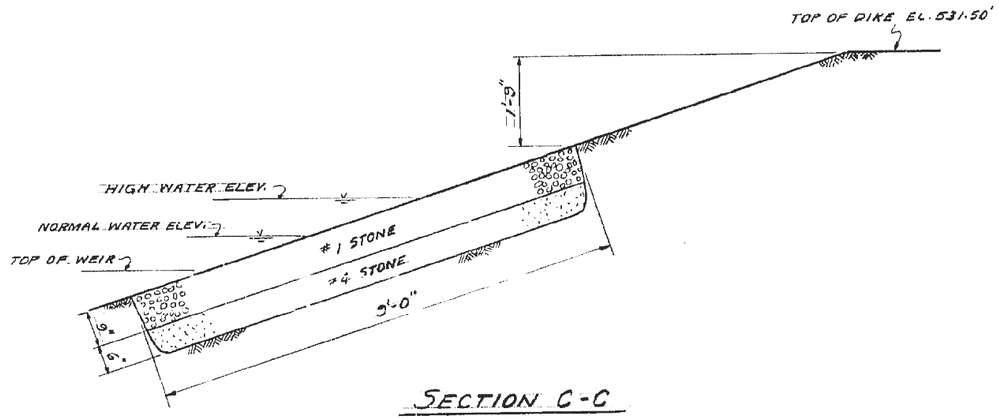
N.T.S.



SECTION B-B

RIP-RAP AROUND TOP OF PIT #6

N.T.S.



SECTION C-C

RIP-RAP AROUND TOP OF PIT #7

N.T.S.

0 1020 2040

Scale in feet

N

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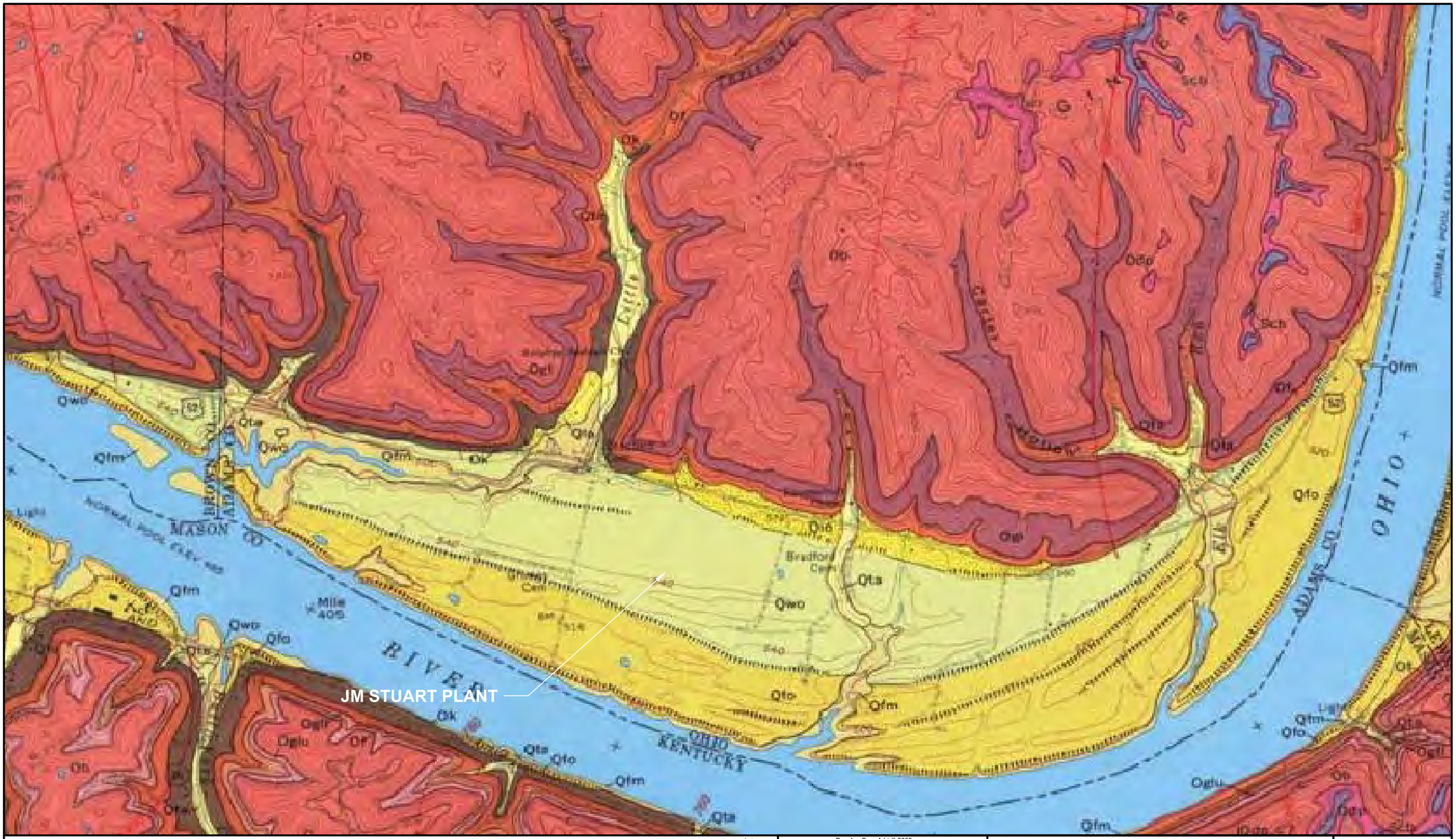
RECORD DRAWING FOR ASH PONDS 6 7 AND 7A – SECTIONS

JM STUART STATION
ABERDEEN, OHIO

PROJECT NO. 20085.1030

DATE: 12/2009

FIGURE 6B



MAP REFERENCE: U.S. Geologic Society, Geologic Map of the Maysville East Quadrangle, Ohio–Kentucky
MAP DATED 1972.

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REGIONAL GEOLOGY

JM STUART STATION
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PROJECT NO. 20085.1030

DATE: 12/2009

FIGURE 7

2.0 FIELD ASSESSMENT

2.1 Visual Observations

CHA performed visual observations of the Ash Pond dikes following the general procedures and considerations contained in FEMA's *Federal Guidelines for Dam Safety* (April 2004), and FERC Part 12 Subpart D to make observations concerning settlement, movement, erosion, seepage, leakage, cracking, and deterioration. A Coal Combustion Dam Inspection Checklist Form, prepared by the US Environmental Protection Agency, was completed on-site during the site visit for each impoundment. A copy of the completed form was submitted via email to a Lockheed Martin representative following the site visit to the JM Stuart Station. Copies of the completed forms are included in Appendix A. Photo logs and Site Photo Location Maps (Figures 8A through 8D) for Ash Ponds 3A, 5, 6, 7/7A, and 10 are located at the end of Chapter 2.7.

CHA's visual observations were made on October 27, 2009 and October 28, 2009. The weather was overcast to partly cloudy with temperatures between 40 and 60 degrees Fahrenheit. Prior to the days we made our visual observations, the following approximate rainfall amounts occurred (as reported by www.weather.com).

Table 3 – Approximate Precipitation Prior to Site Visit

Dates of Site Visits – October 27, 2009 & October 28, 2009		
Day	**Date**	**Precipitation (inches)**
Thursday	October 22, 2009	0.38
Friday	October 23, 2009	0.69
Saturday	October 24, 2009	0.00
Sunday	October 25, 2009	0.00
Monday	October 26, 2009	0.00
Tues	October 27, 2009	0.43
Wednesday	October 28, 2009	0.19
Total	**Week Prior to Site Visit**	**1.69**
Total	**30 Days Prior to Site Visit**	**4.54**

2.2 Visual Observations – Pond 5

CHA performed visual observations of the Pond 5 embankment and outlet structures. Selected pictures are shown in Photos 1 through 24.

2.2.1 Pond 5 - Embankments and Crest

Sluice lines enter the pond at the east end which is mostly filled with bottom ash and the water runs through ditches cut into the bottom ash into the west end of the pond. Photo 2 shows boards that have been placed on the upstream side of the dike at the sluice lines to assist with erosion control. The average observed height from the embankment crest to the water level in the pond (the freeboard) was visually estimated to be approximately 4 to 6 feet. The upstream slopes of the west end are covered with vegetation on the south side and are partially armored with riprap on the north side (Photos 7, 8, 9, 17, 23 and 24). In general, the dikes do not show signs of changes in their horizontal alignments from the proposed alignments. The crest width of the north and south dikes of the Pond 5 embankment were measured to be approximately 23 and 12 feet, respectively.

In general, the south dike (Photo 6) and the north dike (Photos 20 and 21) appeared to be maintained and mowed. However, seepage initiated slope softening and subsequent mowing induced rutting and slope deformation was observed on the downstream slopes of the dikes in at least four locations. One such area measured approximately 326 feet long approximately 52 feet from the toe with 6 to 12 inches of standing water (Photos 15 and 16). These areas often had heavier vegetation, scrub brush, and small trees established where routine tractor mounted mowing had not occurred for a fairly long period of time as a consequence of the softened slope conditions (Photos 11 and 12). In most cases however, these areas were generally covered with heavier grass and other weedy vegetation (Photos 10, 19 and 22)

In addition to the seeps and resulting softened slope areas, scarp areas were observed on the south side of the pond and western extremity of the pond. A scarp on the south dike (Photo 13) occurred along a heavily vegetated, over-steepened portion of the dike adjacent to a haul road drainage ditch. It measured roughly 52 feet in length along the dike centerline. The scarp encountered on the west end of the pond measured approximately 30 feet in length and appeared to occur in a location of softer soil (Photo 14). Standing water was observed in this scarp and the soft soil in the area of the scarp it is likely the result of seepage at this location.

2.2.2 Pond 5 Outlet Structures

Near the west end of the pond an outlet structure was observed (Photos 8 and 9). It appeared to be a concrete drop inlet intake structure with metal sheeting and a skimmer to keep debris from fouling the structure. The outlet structure appeared to be operating properly. The observed location of the outlet structure differs from the location shown on the 1968 drawing.

2.3 Visual Observations– Pond 10

CHA performed visual observations of the Pond 10 embankment and outlet structures. Selected pictures are shown in Photos 25 through 38.

2.3.1 Pond 10 - Embankments and Crest

Pond 10 was the most recently constructed pond. At the time of the site visit, the pond was inactive with a shallow pool of water at the south end of the pond as seen in Photo 25. Most of the collected ash was excavated to landfill during the summer; some ash remains at the north end of the pond as seen in Photo 26.

The dikes and crest areas of Pond 10 do not show signs of changes in their horizontal alignments from the proposed alignments. The crest was measured to be approximately 17 feet wide and is

used as an access road when the pond is active. Presently, inactive sluice pipe segments are stored on the dike crest area abutting Landfill 11. This area also retained standing water from landfill runoff at intermittent locations where landfill and facility operations traffic have worn the surface. This appears to be a maintenance and grading related issue and should be addressed when dredging activities resume or the pond is placed back into service.

Downstream or downstream slope areas were typically maintained and mowed and the grass cover was generally consistent, competent, and intact with few readily observable areas of cover loss or erosion as indicated in Photos 28, 33, 37, and 38. Other features observed on the downstream slopes include riprap lined drainage ditches and toe drains on the north and northwest portions of the pond dike. These areas were well maintained and generally free of excess vegetation, except at the grass slope / ditch line interface where mowing equipment cannot function and some weeds have begun to grow (Photo 29). During the site visit, some of these drain outlets conveyed a sparse amount of water, which is believed to be rain water that infiltrated through the slope, given the current inactive status of the basin (Photo 30)

There is intermittent grass and weedy vegetation covering the upstream slopes of the pond (Photos 26, 27, 32, and 36), particularly below the previous operating water levels when the pond was active or ash has been recently removed. Intermittent erosion rills were also noted in the exposed soil on the upstream slope or locations where sheet flow became concentrated.

2.3.2 Pond 10 Outlet Structures

The Pond 10 outlet structure is located near the southeast corner of the pond. It is a rectangular concrete riser configured to accept stop logs to control the operating pool level when the pond is in operation. The riser foundation is several feet above the bottom elevation of Pond 10 placing the invert elevation at a level where the pond cannot be completely emptied through the outlet riser. No water was observed in the structure as the water level was far below the structure at the

time of the site assessment (Photo 33). According to facility personnel, water presently has to be pumped up to the riser to dewater the basin and continue dredging activities.

2.4 Visual Observations – Pond 3A

CHA performed visual observations of the Pond 3A embankment and outlet structures. Selected pictures are shown in Photos 39 through 52.

2.4.1 Pond 3A - Embankments and Crest

In general, the dikes of Pond 3A do not show signs of changes in their horizontal alignments from the proposed alignments. The west dike crest was measured to be approximately 18 feet wide, the south crest was measured to be approximately 13 feet wide, and the east crest was measured to be approximately 20 feet wide. The north dike (Photo 48) functions as a buttress for Landfill 11 and its crest supports one of the main access drives for waste material processing traffic at the facility. It is on the roughly 30 to 40 feet in width.

At the time of the site visit the pond was inactive with very little standing water as shown in Photos 39, 45, and 49. The upstream slopes had varying amounts of vegetative cover, depending upon the extent to which recent dredging activities had occurred. On the south dike, vegetation was sparse to absent on the upstream slope because much of the ash had been removed (Photo 45). This is in contrast to the more prevalent vegetative cover on the north dike where the ash was largely undisturbed (Photo 42). At this location however, evidence of some past beaching erosion that occurred when the pond was active and full of water could be seen.

The downstream slopes were grass covered with occasional erosion rills (Photos 41 and 47) and some rutting from mowing operations. There is an area approximately 140 feet long on the west dike that is over steepened (Photo 40). This appears to be the result of operational activities making space for the presently inactive sluice line positioned at the toe of the western dike. This

sluice line gradually deflects toward the west dike and eventually is supported on a bench excavated into the dike slope at the southern portion of the pond, closer to the south dike. The sluice line turns to the east at the south dike and is supported in a bench along the entire south dike length.

2.4.2 Pond 3A Outlet Structure

The Pond 3A outlet structure is located near the northeast corner of the pond. It is similar to the outlet structure in Pond 10 in that it is a rectangular concrete riser that functions with concrete stop logs to control the operating pool level. The low level invert of this riser appears to be above the pond bottom, which prevents the structure from completely dewatering the pond and allows surface water to collect in the pond bottom. At the time of the site assessment, there was some water observed in the structure from water pumped out of the pond to facilitate dredging activities because the water level was far below the structure invert. (Photo 52).

2.5 Visual Observations – Pond 6

CHA performed visual observations of the Pond 6 embankment and outlet structures. Selected pictures are shown in Photos 53 through 72.

2.5.1 Pond 6 - Embankments and Crest

Pond 6 appears to be impounded by constructed dikes along its eastern and southern sides, a partially incised wall at its western extremity where the ash processing occurs, and a mostly, if not completely, incised northern wall. In general, the dikes of the Pond 6 do not show signs of changes in their horizontal alignments from the proposed alignments.

The western wall is generally obscured, does not impound water, and the crest of the portion that is visible functions as a facility haul road. Outlet pipes from the Pond 3A outfall convey water

through this western wall area to the discharge channel leading to Pond 6 (Photo 53 and 54). In this area the crest and haul road area is well above the Pond 6 elevation as shown in Photo 54.

The north wall of the pond appears to be at the approximate foundation level for Landfill 11 (formerly Pond 8) as seen in Photo 61. This area is moderately to heavily vegetated with weeds, grasses, brush, and smaller trees (Photos 56, 57, 59, and 62). The pond level was down slightly during the site visit, and some beaching erosion was visible as noted in Photos 58 and 59. Standing water was also encountered intermittently in this area (Photo 60), but this was likely due to the recent rains, sheetflow runoff from the landfill, and the fairly flat topography in the area between Pond 6 and Landfill 11.

The east dike is the only embankment on Pond 6 with an exposed downstream slope and it had a measured crest width of about 33 feet. It is estimated that there was only about 2 to 3 feet of exposed dike above the pool surface at the time of the visit. Vegetation was light to sparse on the upstream slope due to the mainly granular surface and riprap (rock concrete) armoring, and consisted mostly of weeds and occasional field grasses when present (Photo 71). This granular surface and low vegetative cover made the surface susceptible to intermittent erosion.

Moderate to heavy vegetation covered the downstream slope of the east dike as shown in Photo 64. Obvious signs of slope instability were difficult to observe through this vegetation; however erosion rills and some substantial gullies were encountered. Smaller rills were on the order of 1 to 2 feet while larger gullies were as deep as 3.5 to 4 feet (Photos 65 and 66). Given the often thick vegetation on the slope where these features were encountered, it is likely that these rills and gullies are relatively old. Other visible features on the east dike slope included a potential animal burrow or cave (Photo 68) adjacent to the northern end of the dike next to a vegetated rock lined groin (Photo 67). A creek has begun to back up near the toe of the slope (Photos 69 and 70) which may be attributed to the recent rain combined with possible beaver activity or a partially blocked culvert.

The dike separating Pond 6 and Pond 7/7A is a bottom ash and gravel covered dike. As discussed previously, the crest width has increased from 16 feet as initially constructed to roughly 60 feet in some places as a result of grading activities and changes in pond operations. In addition, as material was pushed toward the slopes, they became incrementally steeper and the loose, unconsolidated material at the crest edge became subject to erosion. The deep erosion rills observed on the Pond 6 side of the dike (Photo 98) and the shallower erosion rills on the Pond 7 side (Photo 99) of the dike are evidence of this behavior.

The free-board on either side of the dike varied from less than 1 foot to as much as 4 to 5 feet, depending upon the location. In areas closer to the western end of the dike, the freeboard was on the higher end of that range in Pond 7. No water was observed in Pond 6 adjacent to the west end of the separation dike. A 1 to 2 foot difference between the Pond 6 and Pond 7 water levels was visually estimated at the time of the site visit, which facilitated flow from Pond 7 to Pond 6.

2.5.2 Pond 6 Outlet Structure

The Pond 6 outlet structure is located at the northeast corner of the pond. The water from pond 6 flows from the outlet structure (Photo 55) to the nearby pump station. In addition to the present outlet configuration, Pond 6 has an older, inactive outfall along the eastern dike (Photo 72). CHA was not provided information detailing when this structure was taken out of service, but water exiting this structure would by-pass the treatment and sampling facility in the northeast corner of Pond 6.

2.6 Visual Observations – Pond 7/7A

CHA performed visual observations of the Pond 7/7A embankment and outlet structures. Approximately the western third of Pond 7 has filled in with fly ash. Pond 7A was constructed by removing a portion of the ash fill on the northwest corner of the pond to establish a final polishing or clearwater pond for the facility effluent. For this reason these ponds will be

discussed as one impoundment structure and distinctions discussed where necessary. Selected pictures are included in Photos 73 through 101.

2.6.1 Pond 7/7A - Embankments and Crest

In general, the dikes of the Pond 7/7A do not show signs of changes in their horizontal alignments from the proposed alignments. The east dike had a measured crest width of approximately 33 feet and supports a gravel haul road for facility operations. Heavy to very heavy wooded vegetation including briars, underbrush, and trees covered the east dike downstream slope (Photos 74 and 75). This vegetation limited the extent to which the slope could be viewed, however, isolated rodent burrows (Photo 73) along with possible surface sloughs and vegetated scarps were observed. Erosion rills were also evident along the upper part of the east dike in the gravel crest surface (Photos 76 and 80). The majority of the east dike no longer impounds water due to the collection of ash on the western portion of the pond. The filled area is grass covered and currently functions as a lay down area (Photos 77 and 78). Approximately the northern third of the east dike impounds Pond 7A; it has a gravel surface with sporadic weedy vegetation. Occasional erosion rills were also observed in this slope (Photo 76).

The south dike of the pond also has a gravel haul road running along its crest, and is estimated to be about 25 to 30-feet-wide. The east end of the south dike abuts the ash filled area and the western portion of the dike impounds Pond 7. Approximately 1 to 2 feet of the upstream slope within Pond 7 was visible.

The downstream slope of the south dike is moderately to heavily vegetated, particularly on the lower ½ to ⅔ of the slope area where brush and mature trees are established along the lower part of the slope near the toe (Photos 89 and 91). Many of these trees, particularly the very large ones, are growing at the toe of an alluvial bench marking the top of the primary Ohio River flood plain. Smaller trees and heavy brush appear to be established on top of this bench, and have encroached upon the dike slope itself (Photos 90 and 92). The upper portion of the downstream

slope within about 4 to 8 feet of the crest has a granular surface and routine grading activities appear to have limited the establishment of a vegetative cover. This has fostered intermittent erosion rill formation in areas on the crest and slope where surface runoff has been concentrated. (Photo 88).

The west side of Pond 7 appears to be partially incised, with the crest area functioning as a haul road and foundation for Pond 3A (Photo 94). Grading and routine maintenance activities for the haul road have created a very steep upstream slope subject to sloughing (Photo 93). This combination of steep geometry and loose granular slope surface material has resulted in sparse weedy vegetation and erosion rill formation where runoff is concentrated (Photo 95). Since this pond is presently the active ash basin, an ash delta has formed along the portion of the wall adjacent to where the sluice lines enter at the southwest corner of the pond (Photos 87 and 94).

The north dike of the pond is the separator dike between Pond 7/7A and Pond 6. Many of the observations for the north/Pond 6 side of this structure discussed previously (such as the erosion rills and sparse to absent vegetation) were also observed on the south side. There are two different pond levels on the south side of the dike because the Pond 7 pool elevation is roughly 2 to 3 feet higher than the Pond 7A pool elevation. Roughly 300 feet of the southern side of the dike does not impound open water, because it is the area of the pond that was filled in to create Pond 7A.

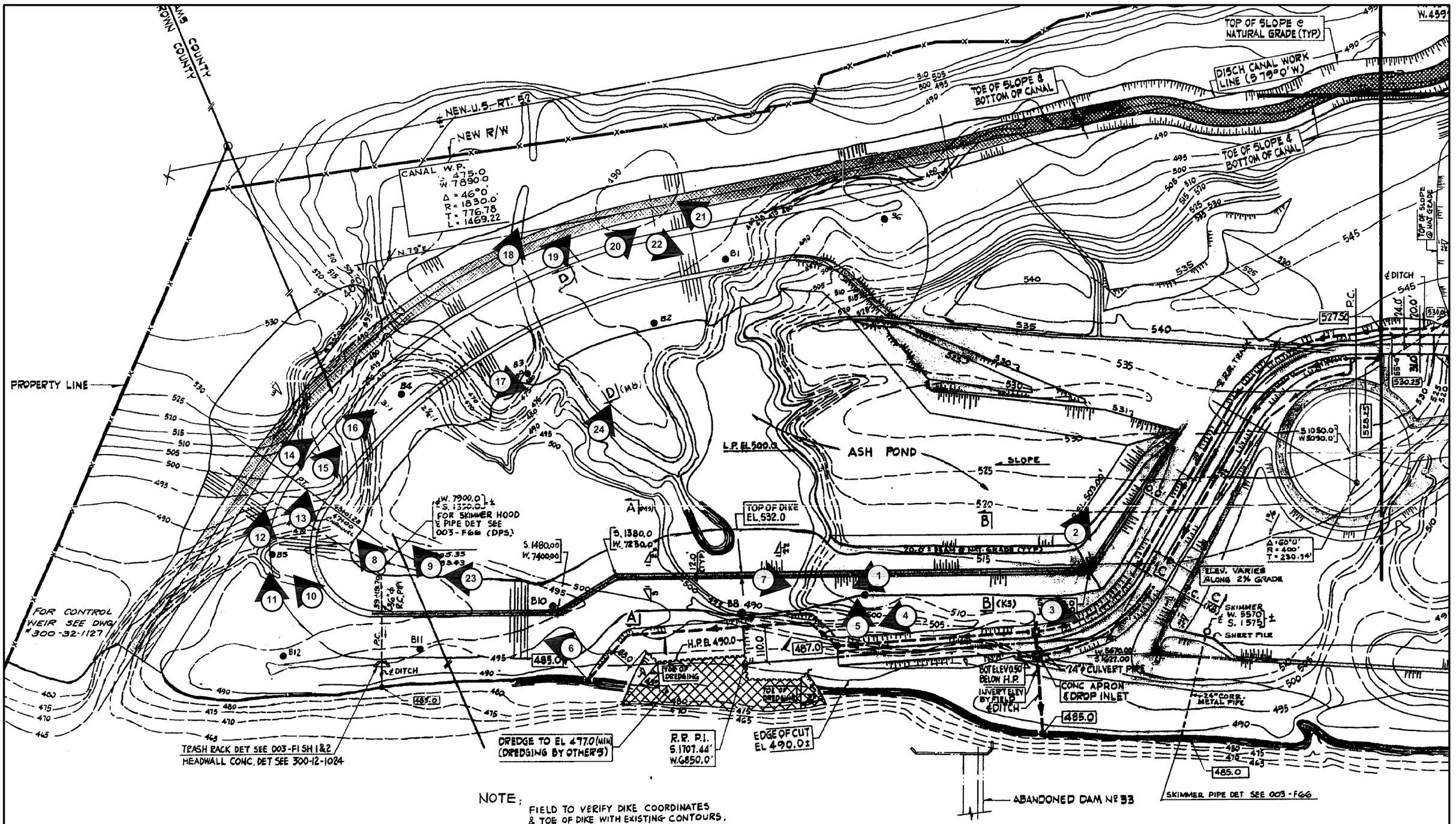
2.6.2 Pond 7/7A Outlet Structures

The Pond 7 outlet structure is a drop inlet connected to a culvert conveying water through the north dike into Pond 6. It is located in a small channel excavated through the ash fill separating Ponds 7 and 7A (Photo 101). At the time of the site assessment, it was submerged and could not readily be observed. It did not appear to be obstructed and was functioning as required. A trash rack or similar device was not readily visible. (Photo 102)

Water enters Pond 7A through a structure on the north side of the pond from Pond 6 and being treated (Photo 81). The Pond 7A outlet structure is located at the east corner of the pond. The water from pond 7A flows from the outlet structure (Photo 82) to the Ohio River discharge (Photo 84).

2.7 Monitoring Instrumentation

Piezometers were observed within the dikes around Ash Pond 5. However, CHA has not been provided with information regarding installation or monitoring of these instruments. CHA is not aware of monitoring instrumentation at this site.



NOTE: FIELD TO VERIFY DIKE COORDINATES & TOE OF DIKE WITH EXISTING CONTOURS.

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PHOTO LOCATION PLAN – POND 5

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DATE: 12/2009

FIGURE 8A

IMAGE REFERENCE: GOOGLE EARTH, IMAGE DATED JUNE 17, 2006.

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PHOTO LOCATION PLAN – POND 10

JM STUART STATION
ABERDEEN, OHIO

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DATE: 12/2009

FIGURE 8B

East-West Baseline

DETAIL "C"
SEE DWG. #300-12-1020C

P.I.
5240.0'
W88.0'

Top Of Dike Elev. 570'-0"

535

540

RAMP DOWN 12% GRADE

℄ ASH PIPES 547.0'

Pit 3A

SEE DWG. #300-12-1020C

OUTFALL EL 506.8'
INV EL 540.0'

M.H.#3

Top of Slope @ No

INVERT EL. 533.0'

Pit #6

Slope

SEE DWG. #300-12-1020C

P.I.
5.345.0'
E. 6.0'

H.P. 495.0'

P.I.
S.1021.0'
E. 6.0'

Top Of Dike Elev. 533.5'

Toe of Slope

2% Slope

TOP DIKE EL. 558.00'

H.P. 435.0'

P.I.
S.1705.0'
E.0.0'

Top Of Dike - E

ASH PIPES

DETAIL "B"
SEE Dwg. #300-12-1020C

Toe Of Slope
Elev. 530.0'

Top of Dike - Elev. 531.5'

℄ EL. ASH PIPES
EL. 534.0'

42 43 44 45 46 47 48 49 50 51 52

39 40 41

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PHOTO LOCATION PLAN – POND 3A

JM STUART STATION
ABERDEEN, OHIO

PROJECT NO. 20085.1030

DATE: 12/2009

FIGURE 8C

1

Looking west along the south dike of pond 5. The Ohio river can be seen on left of photo.

2

Looking north at the sluice lines coming into the pond.

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3

Looking east at the start of the south dike with the plant in the background.

4

Looking southwest at the downstream slope with the Ohio river and off loading area in the background.

5

A close up of some rutting and loss of grass cover from mowing activities.

6

Looking west along the downstream slope of the south dike.

7

Looking east along upstream side of the south dike.

8

Looking north across the pond at the outfall structure.

9

Looking north across the west end of pond 5.

10

Seep softened and deformed area with denser vegetation on the downstream slope at the southwest end of the pond.

11

Heavier vegetation noted in area of seep on southwest end of pond.

12

Another view of heavier vegetation and slope deformation in seep area at west end of pond.

13

Partially vegetated scarp in heavily vegetated, steeper slope on south side of the pond. Approximately 52 feet long. (See arrows)

14

Vegetated scarp with standing water on west side of the pond. Approximately 30 feet long. (See arrows)

15

Close up of a rut with standing seep water.

16

A close up of a larger seep with a sheen on the surface.

17

Looking east across the pond at part of the crest and upstream slope which is lined with riprap.

18

Looking north at toe of the northern dike with the creek in the background .

19

Looking east along the downstream slope of the northern dike.
Notice the taller grass and rutting with standing seep water.

20

Looking northeast along the downstream slope of the northern dike.

21

Looking west along downstream slope of the northern dike back toward the west end of the pond.

22

Looking east at the downstream slope of the northern dike near the middle of the pond where some seepage, subsequent softening, and slope deformation due to rutting has occurred.

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23

Looking west along upstream slope of the southern dike at west end of the pond showing moderate vegetation. Isolated riprap area is visible in this photo (see arrow).

24

Looking north at the upstream slope of the northern dike showing more consistent, maintained riprap armoring.

25

Looking northwest from the top of the outfall structure across the west end of pond 10.

26

Looking northwest across the northern end of the pond and along the upstream slope of the eastern dike.

27

Looking northeast along the crest of the eastern dike. Landfill #11 is off the right of the photo

28

Looking east at the toe of the northern tip of pond ten with landfill 11 in the background.

29

Looking northwest along the riprap drainage swale at the north tip of the pond

30

Close up of the drainage pipes that empty into the riprap drainage swale.

31

Looking southwest along the downstream slope of the northern dike.

32

Looking south west along the upstream slope of the northern dike.

33

Looking north across pond back toward the outfall structure and truck ramp.

34

Looking northeast along the crest of the northern dike.

35

Looking northwest along the crest of the southwest dike.

36

Looking northwest across pond 10.

37

Looking southeast along downstream slope and crest of southwestern dike.

38

Looking southeast at downstream slope and crest of southwestern dike at the southeast corner.

39

Looking south along the western dike crest of pond 3A.

40

Looking south along the downstream slope at over-steepened area of the west dike of pond. Note sluice pipe near dike toe.

41

Close up of erosion at edge of crest under the fence on the west dike of pond.

42

Looking east at upstream slope of the north dike of the pond.
There is some beaching just above the ash line on the upstream slope.

43

Looking north along the downstream slope of the west dike from the south end. Note sluice pipe on slope.

44

Looking east along the downstream slope of the south dike. Inactive sluice pipe in bench is visible at dike toe.

45

Looking east along the upstream slope of the southdike.
There was very little grass cover due to summer dredging activities.

46

Looking east along the crest of the south dike.

47

A close up of erosion rills and loss of grass cover on the downstream slope of the east dike.

48

Looking west along the road on the north dike. Landfill 11 is shown on the right side of the photo.

49

Looking north along the upstream slope at the east dike of pond 3A.

50

Looking north along the crest of the east dike.
The outfall structure is in the background near the northeast corner of the pond.

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51

Looking south along the upstream slope of the east dike from the north end.

52

Close up of inside the outfall structure.

53

The outlet pipes from Pond 3A beneath western dike wall of Pond 6, looking north.

54

Looking east at the discharge channel that conveys effluent from Pond 10 and Pond 3A into Pond 6. Open water in Pond 6 is in distant background (see arrow).

55

Pond 6 outfall structure at the northeast corner of the pond.

56

Inlet channel from Pond 7 into Pond 6

57

Moderate to heavy weedy, brushy vegetation on north dike of Pond 6, looking west.

58

Looking west at beaching erosion (arrow) on north wall of Pond 6. Recent high water level is evident from deposited ash in picture.

59

Vegetation on north dike of Pond 6 and beaching erosion (arrow), looking east.

60

Standing water in grass and weeds adjacent to north wall of Pond 6.

61

Looking west along the northern side of Pond 6. Landfill 11 is off the right side of photo.

62

Looking west along the northern side of Pond 6 from a point farther west than shown in Photo 61.

63

Looking east along the north edge of Pond 6 from the northwest end of pond.

64

Looking south along the downstream slope of the east dike of Pond 6.

65

Deep, heavily vegetated erosion gullies on downstream east dike slope of Pond 6. These were 3.5 to 4 feet deep located near the north end of the dike.

66

Vegetated erosion rill toward the center of the east dike of Pond 6 approximately 1.0 to 2.0 feet deep.

67

Looking up slope at the start of the eastern dike at Pond 6.
Vegetation obscures rock groin in this area.

68

Close up of a possible rodent burrow or animal cave in the dense vegetation on the downstream slope of Pond 6 east dike.

69

Downstream east dike slope of Pond 6, looking north from mid-slope.
Creek area at toe on right side of photo (arrow).

70

Another view of water in creek backing up against downstream toe on east dike of Pond 6.

71

Looking south along the Pond 6 east dike crest and upstream slope toward the old outfall structure.

72

Close up of the old outfall structure.

73

Close up of a potentially abandoned rodent hole in the downstream slope of Pond 7/7A east dike.

74

Dense to very dense vegetation on the downstream slope of Pond 7/7A east dike.

75

Looking north along the downstream slope of the east dike of Pond 7A.

76

Looking south along the crest and upstream slope of the Pond 7A east dike.
Note the erosion rills at the crest (arrows).

77

Looking southwest from east dike crest across portion of Pond 7 filled in to form Pond 7A. Note grassed lay down area.

78

Looking west along south side of Pond 7A and filled in portion of Pond 7.

79

Looking southwest across Pond 7A from the northeast corner.

80

Looking south along the crest and downstream slope of the east dike. Note erosion rills near crest (arrow).

81

Looking northerly toward the influent gate in Pond 7A from the treatment station and outfall on Pond 6.

82

Close-up of outfall structure at Pond 7A

83

Looking up the slope of the Pond 7 south dike along the Ohio River near the location of the outfall into the river.

84

A close up of the outfall to the river from Pond 7A.

85

Looking northwest across Pond 7.

86

Close up of upstream slope of Pond 7 south dike.

87

Looking at the northwest corner of Pond 7 showing ash delta and sluice lines (arrow). Pond 3A's east dike is in the background.

88

Looking east along the crest and downstream slope of Pond 7 south dike. Note erosion rills in slope (arrows)

89

A close up of a large tree on the downstream slope of Pond 7 south dike near the Ohio River bank.

90

Looking east along the toe of the Pond 7 south dike near the Ohio River bank.

91

Another view of larger trees at the toe of the downstream slope of Pond 7 near the Ohio River bank.

92

Looking east along the downstream slope of the Pond 7 south dike near the Ohio River bank. Note heavier woody vegetation and trees encroaching on dike toe.

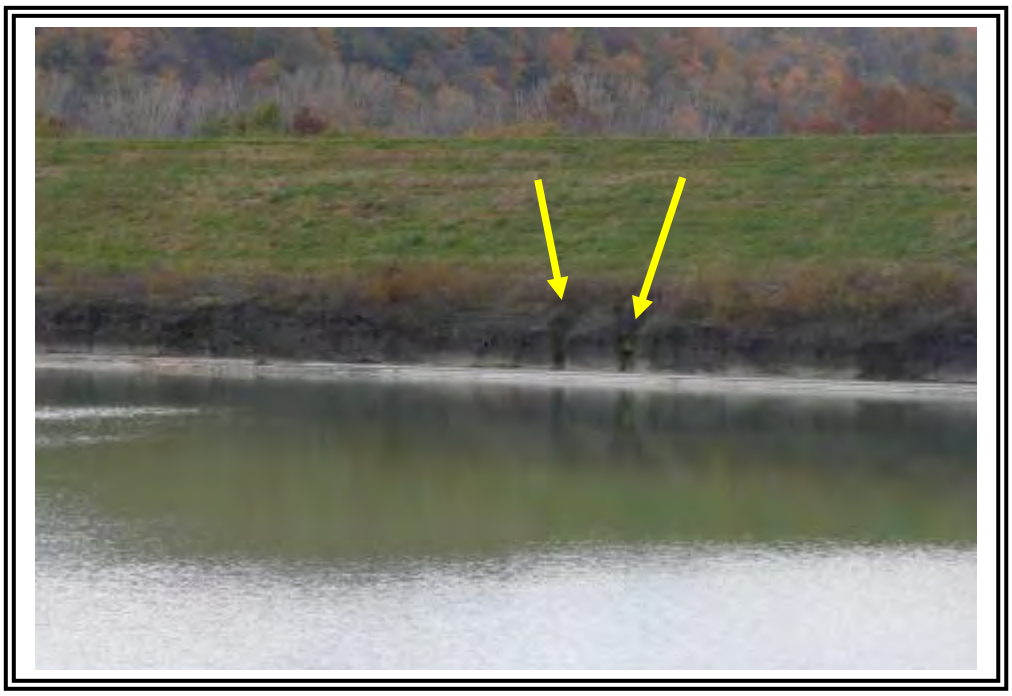
93

Close-up of steep upstream slope and looser material on western dike of Pond 7.

94

Looking north along the Pond 7 west dike upstream slope. Note ash delta in pond surface.

95



Looking west at steep upstream slope and erosion rills (arrows) on western dike of Pond 7.

96

Looking west along the Pond 7/7A north dike upstream slope impounding Pond 7A.
Note gravel slope surface and freeboard at this location of the dike.

97

Looking west along the separator dike between Pond 7 (left) and Pond 6 (right).

98

Close up of deep erosion rill in the Pond 6 side of the separator dike.

99

Erosion rills on Pond 7 side of separator dike between Pond 6 and Pond 7/A.

100

Pond 6 and Pond 7/7A separator dike looking east showing open water in Pond 7/7A on right and ash processing in Pond 6 on left.

101

Channel to outlet structure excavated through ash fill in northwest corner of Pond 7.

102

Submerged outlet structure for Pond 7 to Pond 6. Note absence of inlet protection.

CHA	**DAYTON POWER & LIGHT** **J.M. STUART STATION** **ABERDEEN, OH** **PONDS 7/7A**
CHA Project No.: 20085.1030.1510	October 38 & 29, 2009

3.0 DATA EVALUATION

3.1 Design Assumptions

CHA has reviewed the design assumptions related to the design and analysis of the stability and hydraulic adequacy of the Bottom Ash Pond and South Fly Ash Pond available at the time of our site visits and provided to us by DP&L and ODNR. The design assumptions are listed in the following sections.

3.2 Hydrologic and Hydraulic Design

Ponds 3A, 5, 6, 7, 7A, and 10 are classified as Class II dams based on the Ohio Revised Code Chapter 1521 and Administrative Rules Chapter 1501:21 as indicated in the Division of Water Permit No. 87-159 dated February 19, 1987. This is based on the fact that a sudden breach or failure could release health hazardous industrial waste and impact the Ohio River. Ohio Administrative Code Rule 1501:21-13-02 states that the minimum design flood for Class II dams is 50% of the probable maximum flood (PMF) or the critical flood.

Ohio Administrative Code Rule 1501:21-13-07 requires that embankment crest of up-ground reservoirs shall be at least five (5) feet higher that designed maximum operating pool elevation unless otherwise approved. In addition, every up-ground reservoir shall have an overflow or other device to preclude overfilling the reservoir during normal filling operations.

Information was not provided to CHA regarding the maximum operating and current pool elevations. However, CHA noted during our site visit that the approximate free-board in Pond 5 was 4 to 6 feet, in Pond 6 was 2 to 3 feet; in Pond 7 was 1 to 2 feet; and in Pond 7A about 5 to 6 feet. Ponds 3A and 10 were inactive and the water level was significantly below the spillway elevations.

DP&L has not provided CHA with a hydraulic analysis showing the ability of the ponds to safely store or pass the 50% PMP event. CHA had insufficient information to perform preliminary analyses. In particular, the DP&L letter to the EPA provides maximum capacity and current volume information as of March 1, 2009. However, it is unclear if the maximum capacity is computed to the lowest point on the dike crest and if the current volume includes both the collected sediment and water or was only the volume of sediment in the pond.

3.3 Structural Adequacy & Stability

In regards to evaluating the structural adequacy and stability of dams, the Ohio DNR Division of Water- Dam Safety Program recognizes "design procedures that have been established by the United States Army Corps of Engineers, the United States Department of Interior, Interior Bureau of Reclamation, the Federal Energy Regulatory Commission, The United States Natural Resources Conservation Service, and others that are generally accepted as sound engineering practice, will be acceptable to the Chief." Table 4 outlines minimum required factors of safety as outlined by the U.S. Army Corps of Engineers in EM 1110-2-1902, Table 3-1.

Table 4 - Minimum Safety Factors Required

Load Case	Required Minimum Factor of Safety
Steady State Conditions at Present Pool or Maximum Storage Pool Elevation	1.5
Rapid Draw-Down Conditions from Present Pool Elevation	1.3
Maximum Surcharge Pool (Flood) Condition	1.4
Seismic Conditions from Present Pool Elevation	1.0
Liquefaction	1.3

CHA was not provided with information regarding stability analyses performed for the Ash Ponds. Without having received site specific subsurface information, CHA was unable to perform a preliminary stability analyses for dikes. Our recommendation that subsurface investigations and stability analyses be performed for the Ash Ponds is discussed in Section 4.6.

3.4 Foundation Conditions

CHA has not been provided with geotechnical subsurface information for the JM Stuart site. CHA was provided with several record drawings related to construction of the ash ponds at the site. The information provided is described below in chronological order.

Drawings 300-12-1020, -1022, and -1023 (1966) related to construction of the Station, an ash pond west of the plant, and a coal storage area and ash disposal area east of the plant. The cross section on the 1966 drawings implies that the Station buildings are supported on pile foundations. The notes on the 1966 drawings provide the following information regarding construction of the dikes:

- The area shall be stripped of "all fences, timber, stumps, structures, or other obstructions, and striped of topsoil, unsuitable or excessively wet earth, vegetation, stubble, surface trash, and perishable matter of all sorts."
- Embankment fill material shall be excavated from the borrow areas on the site.
- Fill material shall have a maximum particle size of 6 inches and stone shall not constitute more than 20 percent of the volume.
- No brush, roots, ice, snow, perishable, or other unsuitable shall be included in the fill material.
- Embankments shall be constructed in horizontal 8-inch-thick layers "insofar as is feasible"
- Fill must be compacted to 90 percent of the maximum dry density as determined by the modified Proctor method.
- Fill shall not be placed on excessively wet or frozen subgrade.

Drawing 300-13-1143 (1969) shows plan and sections views for Ash Pond 5. Ash pond 5 was constructed within the ash pond located west of the power plant shown on the 1966 drawings. Notes on the 1969 drawing indicate that existing muck is to be removed to the top of the

compacted clay and replaced with compacted backfill. Specifications for the backfill gradation or compaction requirements are not provided on this drawing.

Drawing 300-12-1020A (1972) shows a site plan and sections for Ash Ponds 6 and 7. Section A-A indicates that the western dike is to be constructed by placing additional fill above the existing ash pond dike. Sections B-B and C-C indicate that riprap was to be placed on the upstream side of the dikes.

Drawings 300-12-1020B (1976) and 300-12-1020C (1977) show plan and sections for Ash Ponds 3A and 8. Section A-A, which applies to the eastern and southern dikes, indicates that the dikes are to be constructed above an existing 2-foot-thick clay cover. Other sections indicate that the dikes are to be constructed above existing grade. An approximately 3-inch-thick and 40-foot-wide sand drainage blanked is indicated at the base of the downstream slope.

The 1976 drawing indicates that portions of Ash Pond 3A overlapped the Ash Disposal Area shown on the 1966 drawing. In particular, approximately 2/3 of the eastern dike and the southern dike overlap the original Ash Disposal Area Dikes. These drawing do not provide information regarding subgrade preparation, fill gradation, or compaction requirements. Therefore, it is unclear if the existing dikes were removed and if the ash was stripped from below the dikes.

Ash Pond 8 appears to have been constructed within a previously undeveloped portion of the site.

CHA has not been provided with copies of the design drawings for Ash Pond 10. However, comparison of the 1976 drawing for Ash Ponds 3A and 8 with the Site Plan indicates that Pond 10 may be located within the western portion of Ash Pond 8. The eastern portion of Ash Pond 8 is currently in use as a landfill area.

3.5 Operations & Maintenance

CHA has not been provided with a copy of an Operation, Maintenance, and Inspection (OM&I) Manual or Emergency Action Plan (EAO) for the JM Stuart Station. Based upon conversations during our site visit, we understand that Plant personnel make visual observations on a daily basis during the course of their work on-site. However, a formal documented inspection procedure is not in place.

3.6 Inspections

3.6.1 State Inspections

Ohio Revised Code Section 1521.062 states that the owners of dams must monitor, maintain, and operate their dams safely. The owner is to maintain a safe structure and appurtenances through inspection, maintenance, and operation. For Engineering Repairs and Investigations, the dam owner must retain the services of a professional engineer to address the plans, specification, investigative reports, and other supporting documentation. The owner is required to complete the items within five (5) years. Owner repairs may be performed by the dam owner or by a hired contractor.

Representatives of the ODNR Dam Safety Program inspected Ash Pond 10 structures on June 12, 2008 and their observations were summarized in a Dam Safety Inspection Report. The report included required remedial measures based on observation made during the inspection, calculations performed, and requirements of the Ohio Administrative Code. The Dam Safety Inspection Report identified the following required remedial measures:

- Remove trees growing in the rip-rap at the toe of the northeast embankment.
- Establish a regular mowing routine to permit inspection of the upstream slope.

- Keep a detailed record of quarterly inspections by site personnel using the checklists included in the Operations, Maintenance, & Inspection manual.

Representatives of the ODNR Dam Safety Program accompanied the CHA and site representatives during CHA's site assessment on October 27, 2009 and October 28, 2009. Subsequently, ODNR issued a letter to DP&L on November 5, 2009 indicating that a Professional Engineer must be engaged to investigate observed seepage and corresponding stability of the dike at Ash Pond 5. ODNR indicated that the investigation must be completed within 6 months of the date of their letter.

3.6.2 Inspections by Engineering Consultants

DP&L's letter to the DEP responding to the request for information indicates that Civil & Environmental Consultants performed an assessment of Ash Ponds 3A, 5, 6, 7, 7A, and 10 in 2009 and that no significant issues were identified at the time of the inspection. CHA has not been provided with a copy of the inspection report.

4.0 CONCLUSIONS/RECOMMENDATIONS

4.1 Acknowledgement of Management Unit Condition

I acknowledge that the management units referenced herein were personally inspected by me and were found to be in the following condition: **Poor.**

A management unit found to be in poor condition is defined as one in which a safety deficiency is recognized for any required loading condition (static, hydrologic, seismic) in accordance with the applicable dam safety regulatory criteria. Remedial action is necessary. **Poor also applies when further critical studies or investigations are needed to identify any potential dam safety deficiencies.**

4.2 Maintaining Vegetation Growth

Trees and brush should be cleared from all of the interior and exterior slopes of all the Ash Pond dikes. Heavy brush cover precludes observation of erosion, sloughing, rodent activity, or other causes of embankment deterioration.

Tree roots can allow for seepage of the retained water through the dikes, which could lead to internal erosion. Internal erosion could weaken the dikes and cause slope failures. Additionally, the uprooting of trees during storms can create large voids in the embankments that are then susceptible to erosion. Considering the progressive erosion that could occur during a storm which blows the tree over during heavy rains (i.e., hurricane type storm systems) progressive erosion could potentially result in enough loss of soil from the dike to create an unstable situation, which if failure occurs could result in a release of ash.

CHA recommends that vegetation be cut on a regular basis ensure that adequate visual observations are being made by during routine inspections.

4.3 Erosion Protection and Repair

Erosion rills and subsequent loss of grass cover were observed on multiple embankment slopes of the Ash Ponds as discussed in Sections 2.2.1 and 2.3.1. Thinning and loss of grass cover due to concentrated flow was noted on the embankment slopes. CHA recommends repairing these area by filling all rills with compacted material and re-seeding to establish grass where applicable (i.e. exterior embankment slopes).

4.4 Animal Control

Evidence of animal burrows was observed on the downstream side of the several of the dikes. Thick vegetation cover may have obscured borrow at locations not identified herein. CHA recommends vigilance by DP&L personnel to make note of areas disturbed by animal activity, trap the animals, and make repairs to areas to protect the integrity of the dikes.

4.5 Operations and Maintenance

A discrepancy was noted between the Pond 5 crest elevation shown on the 1968 design drawings and the crest elevation reported on the Ohio Dam Inventory Sheet. CHA recommends that a survey be performed to determine the current crest elevation around the dikes.

CHA recommends that existing conditions survey plans be developed for each pond. The drawings should indicate the crest elevations, outlet location and rim elevation, outlet pipe diameter and pipe material, and information on the discharge location.

CHA recommends that DP&L implement a documented inspection program to be conducted at regular intervals. CHA has not been provided with a copy of an OM&I manual or EAP.

4.6 Stability Analysis

It is recommended that detailed stability analyses be performed for the Ash Ponds. CHA was not provided with information regarding stability analyses performed prior to or following construction of the ponds nor was information regarding properties of the embankment and foundation soils provided.

The stability analyses for each pond should include a subsurface investigation to determine existing soil parameters in the embankments and foundation soils and the installation of piezometers to determine the current pheratic surface. Loading conditions that should be modeled should include those listed in Table 4 in Section 3.3.

4.7 Hydrologic and Hydraulic Analysis

DP&L has not provided CHA with a hydraulic analysis showing the ability of the ponds to safely store or pass the 50% PMP event. CHA had insufficient information to perform preliminary analyses. CHA recommends that evaluations be prepared for the ponds to determine the ability of the ponds to safely store or pass the 50% PMP with the actual available storage capacity.

5.0 CLOSING

The information presented in this report is based on visual field observations, review of reports by others and this limited knowledge of the history of the JM Stuart Station surface impoundments. The recommendations presented are based, in part, on project information available at the time of this report. No other warranty, expressed or implied is made. Should additional information or changes in field conditions occur, the conclusions and recommendations provided in this report should be re-evaluated by an experienced engineer.

APPENDIX A

Completed EPA Coal Combustion Dam Inspection Checklist Forms

&

Completed EPA Coal Combustion Waste (CCW) Impoundment Inspection Forms

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: JM Stuart Station	Date: October 28, 2009
Unit Name: JM Stuart Station Ash Pond No. 3A	Operator's Name: Dayton Power and Light Company
Unit I.D.:	Hazard Potential Classification: High **Significant** Low
Inspector's Name: Malcolm D. Hargraves P.E. /Rebecca Filkins	

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	see note		18. Sloughing or bulging on slopes?		x
2. Pool elevation (operator records)?	n/a		19. Major erosion or slope deterioration?	see	note
3. Decant inlet elevation (operator records)?	see note		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	n/a		Is water entering inlet, but not exiting outlet?	n/a	
5. Lowest dam crest elevation (operator records)?	558		Is water exiting outlet, but not entering inlet?	n/a	
6. If instrumentation is present, are readings recorded (operator records)?	n/a		Is water exiting outlet flowing clear?	n/a	
7. Is the embankment currently under construction?		x	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	n/a		From underdrain?	n/a	
9. Trees growing on embankment? (If so, indicate largest diameter below)		x	At isolated points on embankment slopes?	see	note
10. Cracks or scarps on crest?		x	At natural hillside in the embankment area?	n/a	
11. Is there significant settlement along the crest?		x	Over widespread areas?	see	note
12. Are decant trashracks clear and in place?	n/a		From downstream foundation area?	n/a	
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?	n/a		"Boils" beneath stream or ponded water?	n/a	
14. Clogged spillways, groin or diversion ditches?		x	Around the outside of the decant pipe?		x
15. Are spillway or ditch linings deteriorated?		x	22. Surface movements in valley bottom or on hillside?		x
16. Are outlets of decant or underdrains blocked?		x	23. Water against downstream toe?		x
17. Cracks or scarps on slopes?		x	24. Were Photos taken during the dam inspection?	x	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue # Comments n/a = Not Available/Applicable

1 Company does not have a formal inspection program or schedule with documented periodic observations.

2, 3 Pond is currently out of service and drained well below the outlet structure,

with about 1/2 of the ash partially excavated for landfilling.

16 Pond outlets through concrete spillway tower into channel on north side of Pond No. 6.

19 Small to moderate erosion rills and soil cover loss noted intermittently on slopes. Some rills were vegetated.

21 Slope seepage is not likely because the pond is empty; overnight rain prior to and drizzle/mist during the sight visit would have likely obscured readily observable seep areas.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # OH0004316 INSPECTOR Hargraves/Filkins

Date October 27, 2009

Impoundment Name JM Stuart Station Ash Pond No. 3A

Impoundment Company Dayton Power and Light

EPA Region 5

State Agency (Field Office) Addresss Ohio EPA Southeast District Office
2195 Front Street; Logan, Ohio 43138-8687

Name of Impoundment JM Stuart Station Ash Pond No. #

(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New _____ Update x

	Yes	No
Is impoundment currently under construction?	_____	x
Is water or ccw currently being pumped into the impoundment?	_____	x

IMPOUNDMENT FUNCTION: Fly Ash disposal

Nearest Downstream Town : Name Maysville, Kentucky

Distance from the impoundment 3.3 miles

Impoundment Location:

Longitude 83 Degrees 41 Minutes 1 Seconds

Latitude 38 Degrees 38 Minutes 03 Seconds

State Ohio County Adams

Does a state agency regulate this impoundment? YES x NO _____

If So Which State Agency? ODNR - Division of Water

HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

_____ **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

_____ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

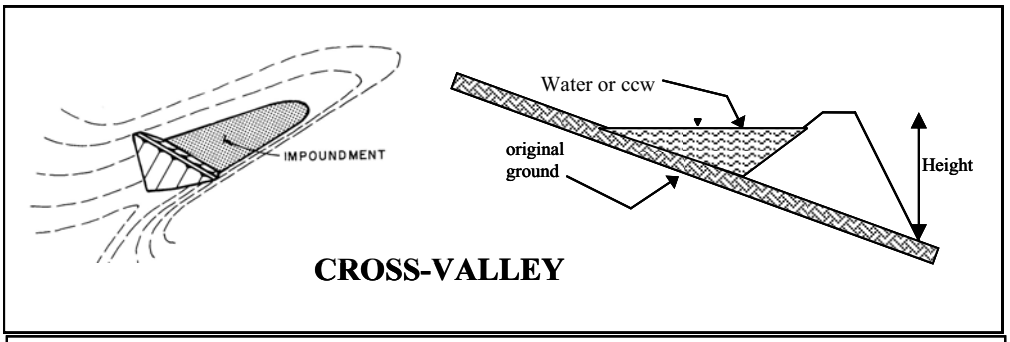
x_____ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

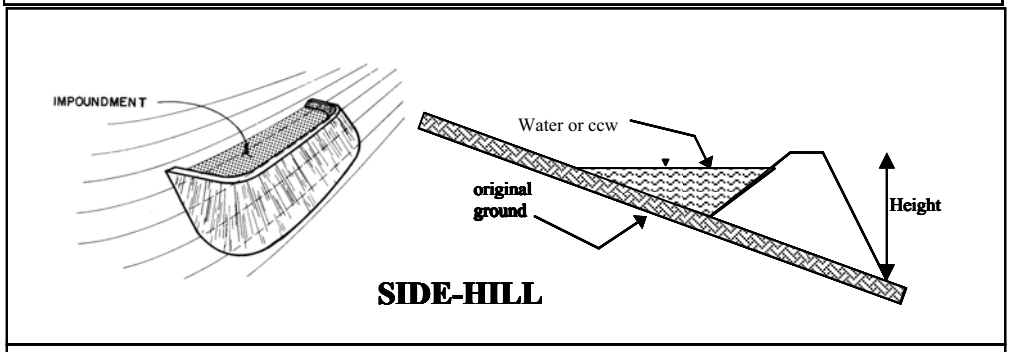
_____ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

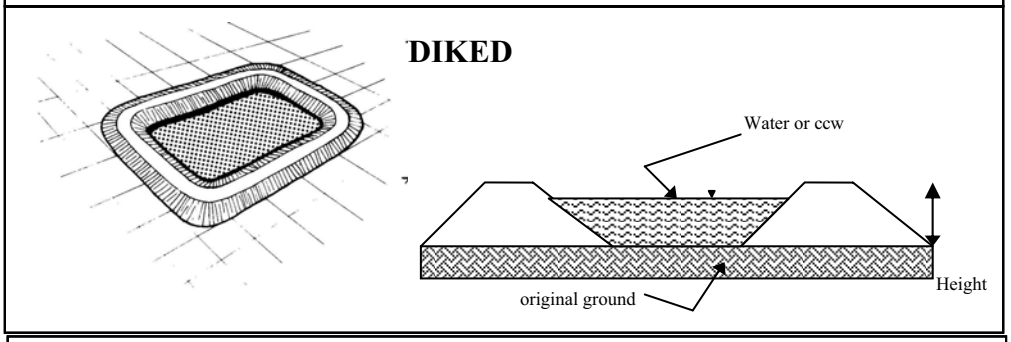
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

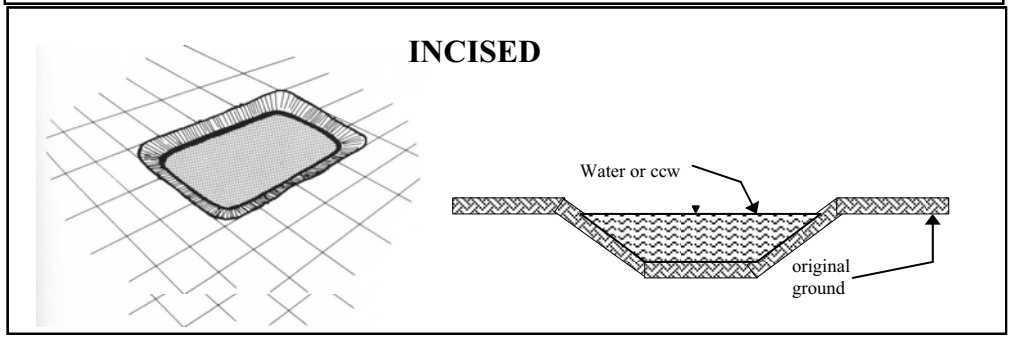
In the event of a failure the breach wave would impact plant access drives, the facility coal pile, and the Ohio River.

CONFIGURATION:









_____ Cross-Valley
_____ Side-Hill
_____ Diked
_____ Incised (form completion optional)
x____ Combination Incised/Diked

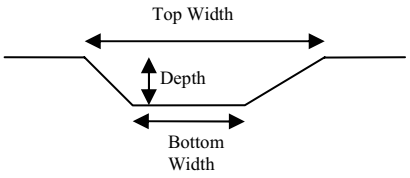
Embankment Height 28 feet
Embankment Material Earth fill
Pool Area 50 acres
Liner none
Current Freeboard 28+ feet
Liner Permeability n/a

TYPE OF OUTLET (Mark all that apply)

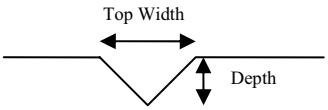
n/a **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

_____ depth
_____ bottom (or average) width
_____ top width
_____

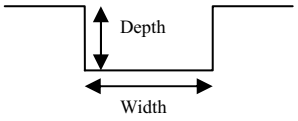
TRAPEZOIDAL



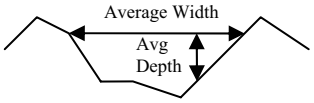
TRIANGULAR



RECTANGULAR

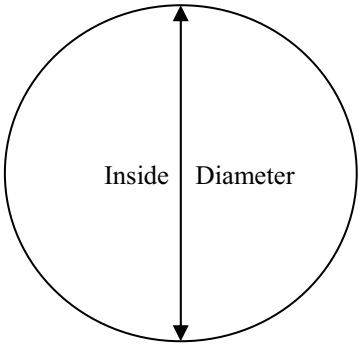


IRREGULAR



x **Outlet**

n/a inside diameter



Material
_____ corrugated metal
_____ welded steel
_____ concrete
n/a plastic (hdpe, pvc, etc.)
_____ other (specify) _____

_____

Is water flowing through the outlet? YES _____ NO x

_____ **No Outlet**

_____

_____ **Other Type of Outlet** (specify) _____

The Impoundment was Designed By n/a
_____

Has there ever been a failure at this site? YES _____ NO x_____

If So When? _____

If So Please Describe :

Has there ever been significant seepages at this site? YES _____ NO x_____

If So When? _____

IF So Please Describe:

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES _____NO x_____

If so, which method (e.g., piezometers, gw pumping,...)? _____

If so Please Describe :

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: JM Stuart Station	Date: October 27, 2009
Unit Name: JM Stuart Station Ash Pond No. 5	Operator's Name: Dayton Power and Light Company
Unit I.D.:	Hazard Potential Classification: High **Significant** Low
Inspector's Name: Malcolm D. Hargraves P.E. /Rebecca Filkins	

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	see note		18. Sloughing or bulging on slopes?	x	
2. Pool elevation (operator records)?	522		19. Major erosion or slope deterioration?		x
3. Decant inlet elevation (operator records)?	n/a		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	n/a		Is water entering inlet, but not exiting outlet?	see	note
5. Lowest dam crest elevation (operator records)?	529		Is water exiting outlet, but not entering inlet?	see	note
6. If instrumentation is present, are readings recorded (operator records)?		x	Is water exiting outlet flowing clear?	see	note
7. Is the embankment currently under construction?		x	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	n/a		From underdrain?	n/a	
9. Trees growing on embankment? (If so, indicate largest diameter below)	x		At isolated points on embankment slopes?	x	
10. Cracks or scarps on crest?		x	At natural hillside in the embankment area?	n/a	
11. Is there significant settlement along the crest?		x	Over widespread areas?	x	
12. Are decant trashracks clear and in place?	x		From downstream foundation area?		x
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		x	"Boils" beneath stream or ponded water?		x
14. Clogged spillways, groin or diversion ditches?		x	Around the outside of the decant pipe?	see	note
15. Are spillway or ditch linings deteriorated?		x	22. Surface movements in valley bottom or on hillside?		x
16. Are outlets of decant or underdrains blocked?	see	note	23. Water against downstream toe?		x
17. Cracks or scarps on slopes?	x		24. Were Photos taken during the dam inspection?	x	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue # Comments n/a = Not Available/Applicable

1 Company does not have a formal inspection program or schedule with documented periodic observations.

9 Trees ranging from 8" to 16" in diameter were noted along with moderate to heavy vegetation in some seep areas on the downstream/outboard slope.

16, 20, 21 Outlet is submerged and buried to pipe effluent to treatment plant on site.

17, 18 Two scarps 52' and 30' long, respectively, were noted near toe on south and west dikes; west scarp near seep area and had standing water (puddle in it).

21 Four soft, vegetated seep areas from 40' to 365' long on dike face and 10' to 81' above toe along slope noted.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # OH0004316 INSPECTOR Hargraves/Filkins

Date October 27, 2009

Impoundment Name JM Stuart Station Ash Pond No. 5

Impoundment Company Dayton Power and Light

EPA Region 5

State Agency (Field Office) Addresss Ohio EPA Southeast District Office
2195 Front Street; Logan, Ohio 43138-8687

Name of Impoundment JM Stuart Station Ash Pond No. 5

(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New _____ Update x

	Yes	No
Is impoundment currently under construction?	_____	x
Is water or ccw currently being pumped into the impoundment?	x	_____

IMPOUNDMENT FUNCTION: Bottom Ash, waste water, cooling tower and FGD blowdown

Nearest Downstream Town : Name Maysville, Kentucky

Distance from the impoundment 2.7 miles

Impoundment Location:
Longitude 83 Degrees 42 Minutes 14 Seconds
Latitude 38 Degrees 38 Minutes 29 Seconds
State Ohio County Adams

Does a state agency regulate this impoundment? YES x NO _____

If So Which State Agency? ODNR - Division of Water

HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

_____ **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

_____ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

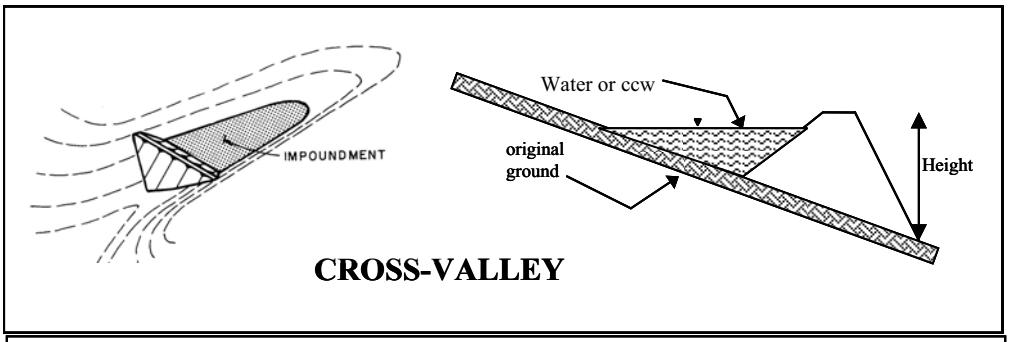
x_____ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

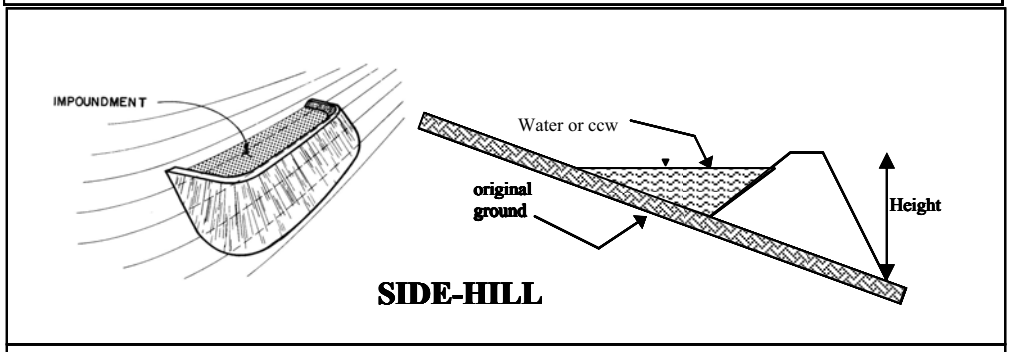
_____ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

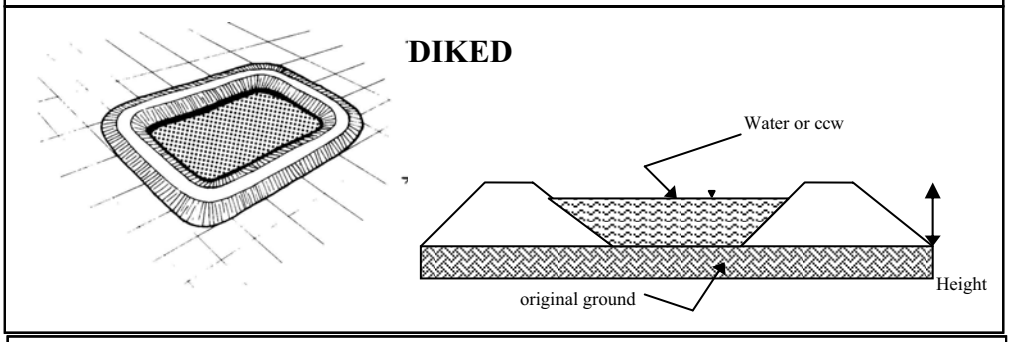
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

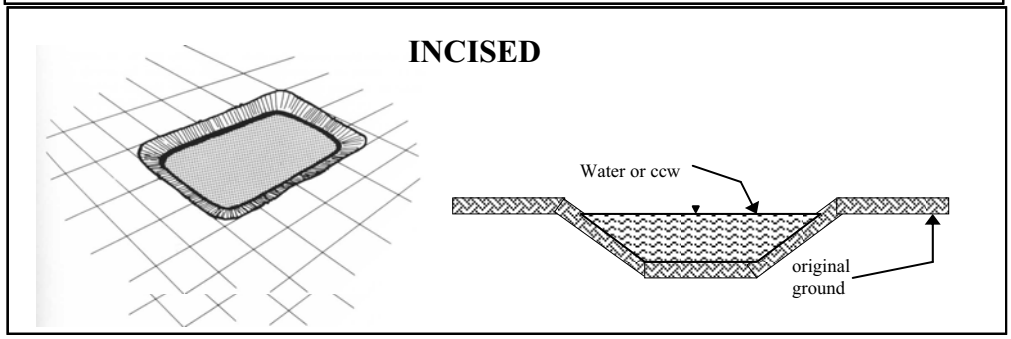
In the event of a failure the breach wave would impact plant drives, a tributary to the Ohio River or the Ohio River directly, and possibly US 52 to the north of the impoundment.

CONFIGURATION:









_____ Cross-Valley
_____ Side-Hill
_____ Diked
_____ Incised (form completion optional)
x____ Combination Incised/Diked

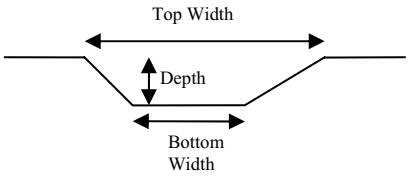
Embankment Height 42 feet
Embankment Material Earth fill
Pool Area 34 acres
Liner none
Current Freeboard _____ feet
Liner Permeability n/a

TYPE OF OUTLET (Mark all that apply)

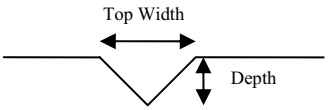
n/a **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

_____ depth
_____ bottom (or average) width
_____ top width
_____

TRAPEZOIDAL



TRIANGULAR



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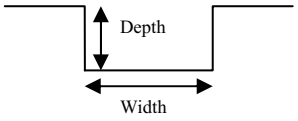

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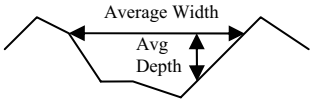
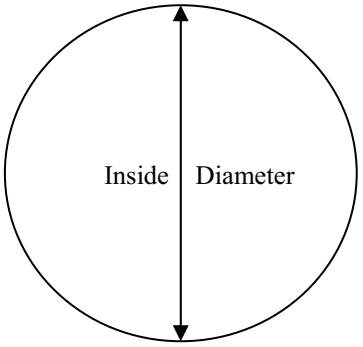


x **Outlet**

n/a inside diameter



Material
_____ corrugated metal
_____ welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
_____ other (specify) _____

_____

Is water flowing through the outlet? YES x_____ NO _____

_____ **No Outlet**

_____

_____ **Other Type of Outlet** (specify) _____

The Impoundment was Designed By n/a_____
_____

Has there ever been a failure at this site? YES _____ NO x_____

If So When? _____

If So Please Describe :

Has there ever been significant seepages at this site? YES see note NO _____

If So When? on-going

IF So Please Describe:

There are at least four seep areas on the outboard face of the dike that need to be controlled, conveyed, and measured to improve dike performance. Most of these seeps noted during the site assessment are located fairly high on the dike and currently appear to be clear, with no signs of running/moving water. The dike surface in the vicinity of the seeps was generally soft and could be probed up to 2 feet deep with a steel rod. These areas were also moderately to heavily vegetated and often rutted up as a result of maintenance equipment (tractor mounted lawn mowers) impacting the areas.

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES see note NO _____

If so, which method (e.g., piezometers, gw pumping,...)? piezometers

If so Please Describe :

The dike has some old piezometers and slope inclinometers installed. Details regarding their installations are not presently known or when they were last read (prior to the site visit), however they appear near a couple of seep areas.

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: JM Stuart Station	Date: October 28, 2009
Unit Name: JM Stuart Station Ash Pond No. 6	Operator's Name: Dayton Power and Light Company
Unit I.D.:	Hazard Potential Classification: High **Significant** Low
Inspector's Name: Malcolm D. Hargraves P.E. /Rebecca Filkins	

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	see note		18. Sloughing or bulging on slopes?		x
2. Pool elevation (operator records)?	528		19. Major erosion or slope deterioration?	x	
3. Decant inlet elevation (operator records)?	n/a		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	n/a		Is water entering inlet, but not exiting outlet?	see	note
5. Lowest dam crest elevation (operator records)?	533.8		Is water exiting outlet, but not entering inlet?	see	note
6. If instrumentation is present, are readings recorded (operator records)?	n/a		Is water exiting outlet flowing clear?	see	note
7. Is the embankment currently under construction?		x	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	n/a		From underdrain?	n/a	
9. Trees growing on embankment? (If so, indicate largest diameter below)		x	At isolated points on embankment slopes?	see	note
10. Cracks or scarps on crest?		x	At natural hillside in the embankment area?	n/a	
11. Is there significant settlement along the crest?		x	Over widespread areas?	see	note
12. Are decant trashracks clear and in place?	x		From downstream foundation area?	see	note
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		x	"Boils" beneath stream or ponded water?		x
14. Clogged spillways, groin or diversion ditches?		x	Around the outside of the decant pipe?	see	note
15. Are spillway or ditch linings deteriorated?		x	22. Surface movements in valley bottom or on hillside?		x
16. Are outlets of decant or underdrains blocked?	see	note	23. Water against downstream toe?	see	note
17. Cracks or scarps on slopes?	see	note	24. Were Photos taken during the dam inspection?	x	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue # Comments n/a = Not Available/Applicable

1 Company does not have a formal inspection program or schedule with documented periodic observations.

16, 20 Spillway outlet to Pond 7A is submerged and cannot be observed.

17 Mod. to heavy vegetation/brush obscured the outboard slope; only major features would be visible - none seen.

19 Deep (3' to 4') erosion gully noted next to rock lined ditch at north abutment.

21 Overnight rain prior to the site visit would have likely obscured readily observable seep areas.

23 Creek began to back up due to overnight rain near east dike toe; not a consistent pool level.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # OH0004316 INSPECTOR Hargraves/Filkins

Date October 28, 2009

Impoundment Name JM Stuart Station Ash Pond No. 6

Impoundment Company Dayton Power and Light

EPA Region 5

State Agency (Field Office) Addresss Ohio EPA Southeast District Office
2195 Front Street; Logan, Ohio 43138-8687

Name of Impoundment JM Stuart Station Ash Pond No. 6

(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New _____ Update x

	Yes	No
Is impoundment currently under construction?	_____	x
Is water or ccw currently being pumped into the impoundment?	x	_____

IMPOUNDMENT FUNCTION: Fly ash, fly ash pond discharge, ash landfill runoff

Nearest Downstream Town : Name Maysville, Kentucky

Distance from the impoundment 3.4 miles

Impoundment Location:
Longitude 83 Degrees 40 Minutes 34 Seconds
Latitude 38 Degrees 37 Minutes 58 Seconds
State Ohio County Adams

Does a state agency regulate this impoundment? YES x NO _____

If So Which State Agency? ODNR - Division of Water

HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

_____ **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

_____ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

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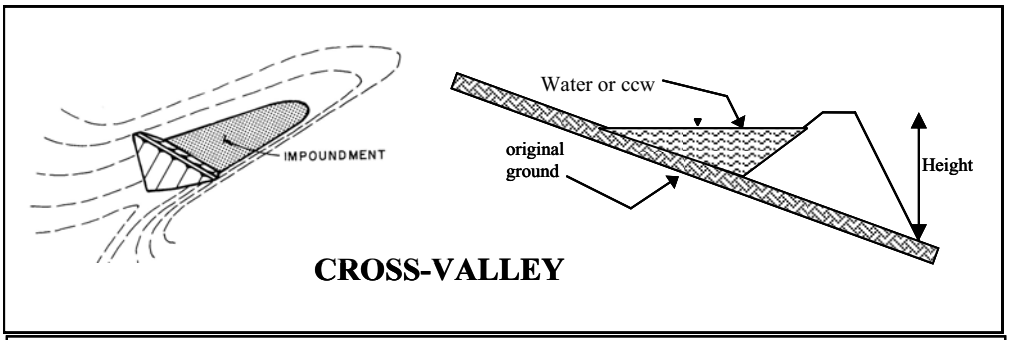
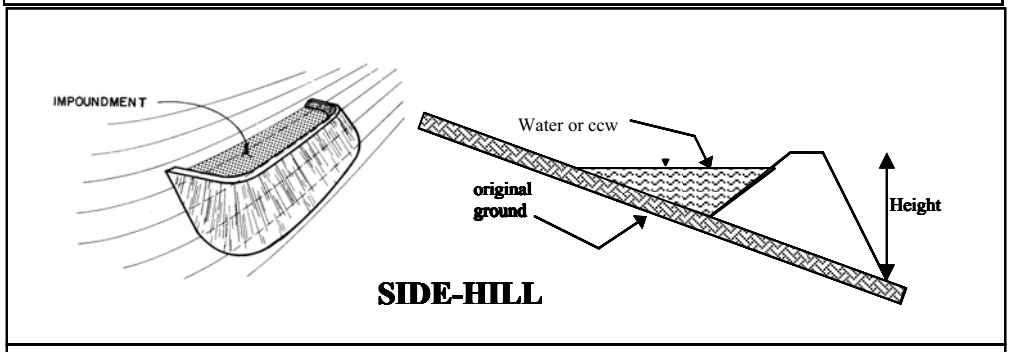
_____ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

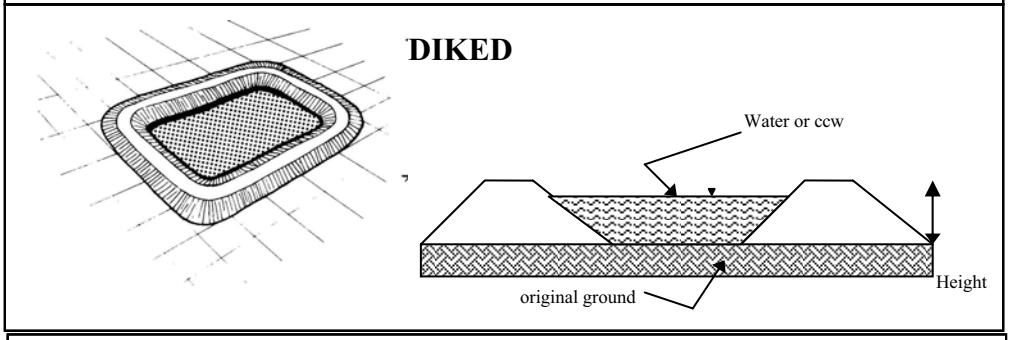
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

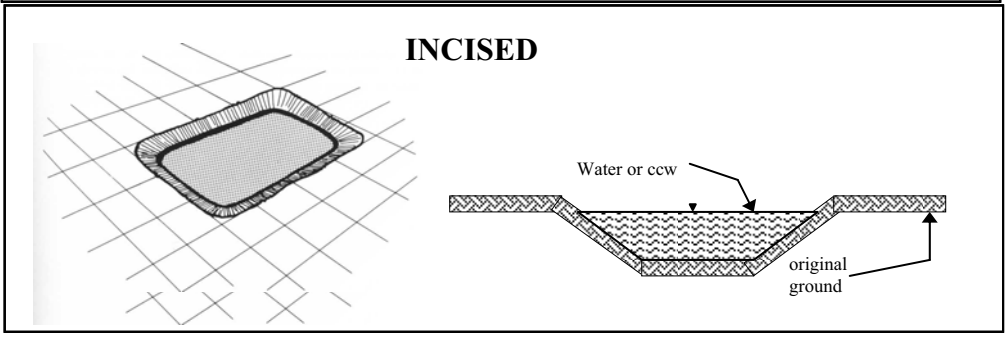
In the event of a failure the breach wave would impact plant access drives, a small tributary to the Ohio River, and eventually the Ohio River.

CONFIGURATION:









_____ Cross-Valley
_____ Side-Hill
_____ Diked
_____ Incised (form completion optional)
x____ Combination Incised/Diked

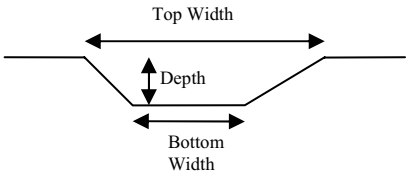
Embankment Height 42 feet
Embankment Material Earth fill
Pool Area 37 acres
Liner none
Current Freeboard north dike - 2 feet
Liner Permeability n/a

TYPE OF OUTLET (Mark all that apply)

n/a **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

_____ depth
_____ bottom (or average) width
_____ top width
_____

TRAPEZOIDAL



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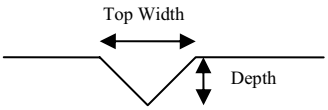

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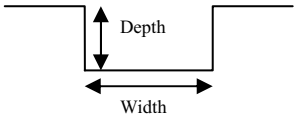
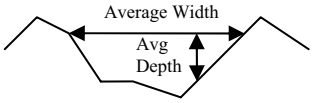
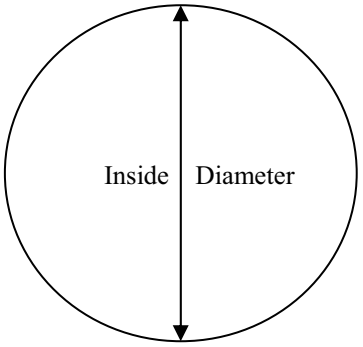


IRREGULAR



x **Outlet**

48" inside diameter



Material
x corrugated metal
_____ welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
_____ other (specify) _____

_____

Is water flowing through the outlet? YES x _____ NO _____

_____ **No Outlet**

_____

_____ **Other Type of Outlet** (specify) _____

The Impoundment was Designed By n/a
_____

Has there ever been a failure at this site? YES _____ NO x_____

If So When? _____

If So Please Describe :

Has there ever been significant seepages at this site? YES _____ NO x_____

If So When? _____

IF So Please Describe:

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES _____NO x_____

If so, which method (e.g., piezometers, gw pumping,...)? _____

If so Please Describe :

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: JM Stuart Station	Date: October 28, 2009
Unit Name: JM Stuart Station Ash Pond No. 7	Operator's Name: Dayton Power and Light Company
Unit I.D.:	Hazard Potential Classification: High **Significant** Low
Inspector's Name: Malcolm D. Hargraves P.E. /Rebecca Filkins	

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	see note		18. Sloughing or bulging on slopes?		x
2. Pool elevation (operator records)?	see note		19. Major erosion or slope deterioration?	see	note
3. Decant inlet elevation (operator records)?	see note		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	n/a		Is water entering inlet, but not exiting outlet?	see	note
5. Lowest dam crest elevation (operator records)?	531.5		Is water exiting outlet, but not entering inlet?	see	note
6. If instrumentation is present, are readings recorded (operator records)?	n/a		Is water exiting outlet flowing clear?	x	
7. Is the embankment currently under construction?		x	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	n/a		From underdrain?	n/a	
9. Trees growing on embankment? (If so, indicate largest diameter below)	x		At isolated points on embankment slopes?	see	note
10. Cracks or scarps on crest?		x	At natural hillside in the embankment area?	n/a	
11. Is there significant settlement along the crest?		x	Over widespread areas?	see	note
12. Are decant trashracks clear and in place?	x		From downstream foundation area?	see	note
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?		x	"Boils" beneath stream or ponded water?		x
14. Clogged spillways, groin or diversion ditches?		x	Around the outside of the decant pipe?		x
15. Are spillway or ditch linings deteriorated?		x	22. Surface movements in valley bottom or on hillside?		x
16. Are outlets of decant or underdrains blocked?		x	23. Water against downstream toe?		x
17. Cracks or scarps on slopes?	see	note	24. Were Photos taken during the dam inspection?	x	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue # Comments n/a = Not Available/Applicable

1 Company does not have a formal inspection program and schedule with documented periodic observations.

2 Pond 7 subdivided to make smaller Pond 7A. Pond 7 discharges to Pond 6; Pond 7A accepts effluent from Pond 6 and discharges to the Ohio River.

9 East and south dikes heavily vegetated with weeds, brush, and trees up to 8 to 10 inches in diameter.

17, 19 Heavy vegetation/trees obscured the outboard slope; only major features would be visible - none observed.

20 Pond 7 to Pond 6 culvert partially submerged; inlet to Pond 7A from Pond 6 submerged.

21 Overnight rain prior to the site visit would have likely obscured readily observable seep areas.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # OH0004316 INSPECTOR Hargraves/Filkins

Date October 28, 2009

Impoundment Name JM Stuart Station Ash Pond No. 7

Impoundment Company Dayton Power and Light

EPA Region 5

State Agency (Field Office) Addresss Ohio EPA Southeast District Office
2195 Front Street; Logan, Ohio 43138-8687

Name of Impoundment JM Stuart Station Ash Pond No. 7

(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New _____ Update x

	Yes	No
Is impoundment currently under construction?	_____	x
Is water or ccw currently being pumped into the impoundment?	x	_____

IMPOUNDMENT FUNCTION: Fly Ash disposal (Pond 7) ; polishing pond (Pond 7A)

Nearest Downstream Town : Name Maysville, Kentucky

Distance from the impoundment 3.4 miles

Impoundment Location:
Longitude 83 Degrees 40 Minutes 41 Seconds
Latitude 38 Degrees 37 Minutes 52 Seconds
State Ohio County Adams

Does a state agency regulate this impoundment? YES x NO _____

If So Which State Agency? ODNR - Division of Water

HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

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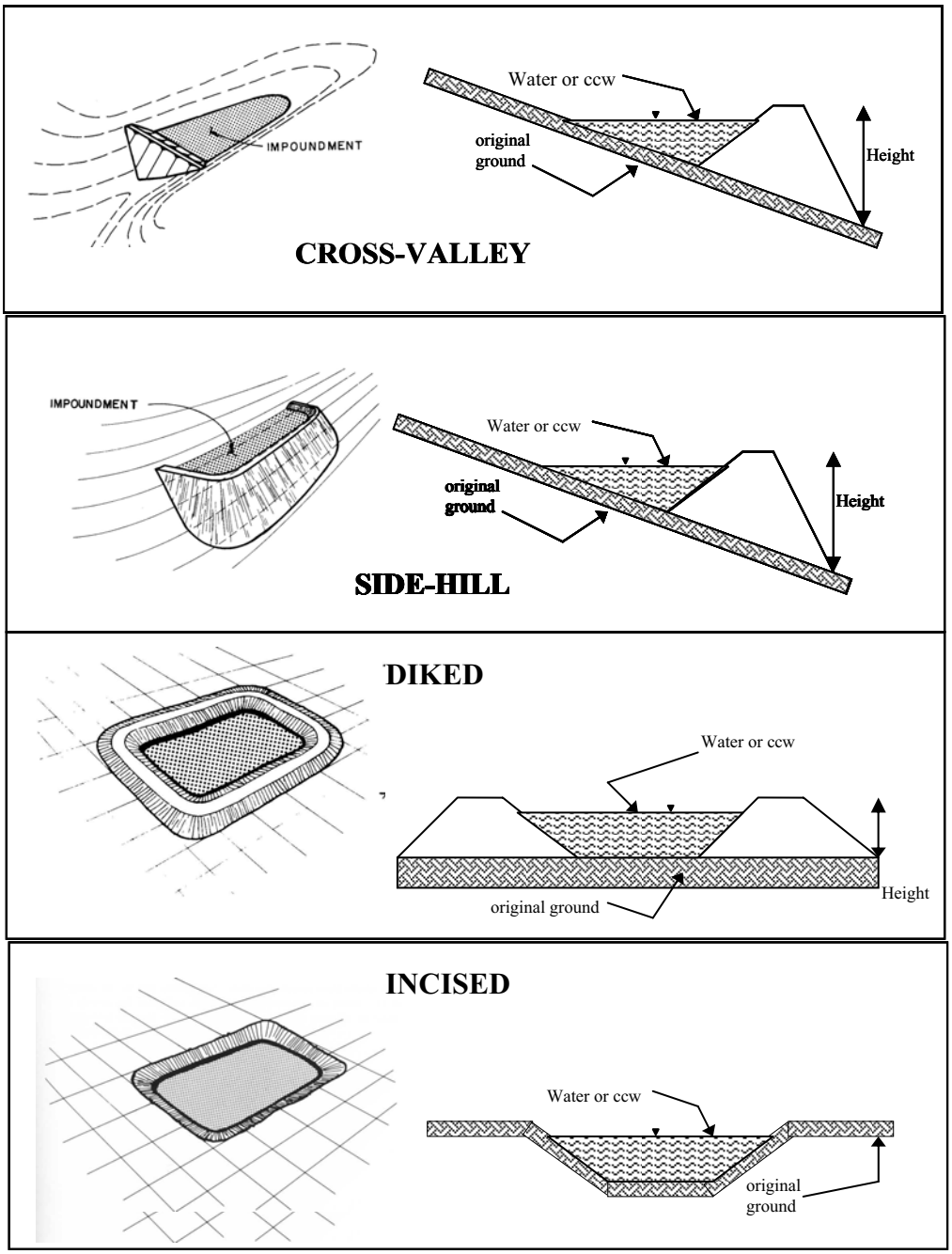
DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

In the event of a failure the breach wave would impact plant access drives, a small tributary to the Ohio River and the Ohio River.

CONFIGURATION:



_____ Cross-Valley
_____ Side-Hill
_____ Diked
_____ Incised (form completion optional)
x____ Combination Incised/Diked

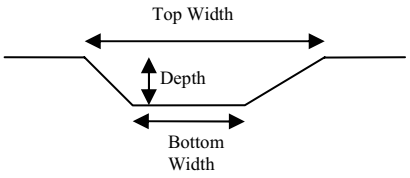
Embankment Height 42 feet
Embankment Material Earth fill
Pool Area 37 acres
Liner none
Current Freeboard south dike - 2 feet
Liner Permeability n/a

TYPE OF OUTLET (Mark all that apply)

n/a **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

_____ depth
_____ bottom (or average) width
_____ top width
_____

TRAPEZOIDAL



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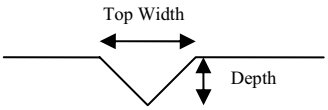

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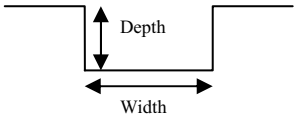

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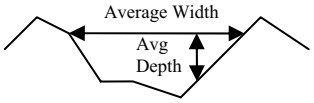
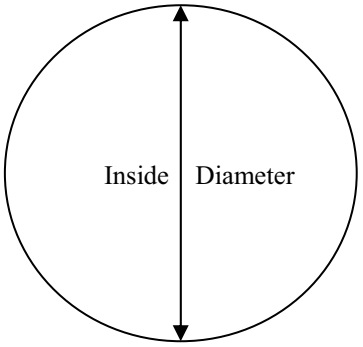


x **Outlet**

48" inside diameter



Material
x corrugated metal
_____ welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
_____ other (specify) _____

_____

Is water flowing through the outlet? YES x _____ NO _____

_____ **No Outlet**

_____

_____ **Other Type of Outlet** (specify) _____

The Impoundment was Designed By n/a
_____

Has there ever been a failure at this site? YES _____ NO x_____

If So When? _____

If So Please Describe :

Has there ever been significant seepages at this site? YES _____ NO x_____

If So When? _____

IF So Please Describe:

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES _____NO x_____

If so, which method (e.g., piezometers, gw pumping,...)? _____

If so Please Describe :

Coal Combustion Dam Inspection Checklist Form

US Environmental Protection Agency

Site Name: JM Stuart Station	Date: October 27, 2009
Unit Name: JM Stuart Station Ash Pond No. 10	Operator's Name: Dayton Power and Light Company
Unit I.D.: OH03030	Hazard Potential Classification: High **Significant** Low
Inspector's Name: Malcolm D. Hargraves P.E. /Rebecca Filkins	

Check the appropriate box below. Provide comments when appropriate. If not applicable or not available, record "N/A". Any unusual conditions or construction practices that should be noted in the comments section. For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	see note		18. Sloughing or bulging on slopes?		x
2. Pool elevation (operator records)?	see note		19. Major erosion or slope deterioration?		x
3. Decant inlet elevation (operator records)?	max. 565		20. Decant Pipes:		
4. Open channel spillway elevation (operator records)?	n/a		Is water entering inlet, but not exiting outlet?	n/a	
5. Lowest dam crest elevation (operator records)?	568		Is water exiting outlet, but not entering inlet?	n/a	
6. If instrumentation is present, are readings recorded (operator records)?	n/a		Is water exiting outlet flowing clear?	n/a	
7. Is the embankment currently under construction?		x	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation,stumps, topsoil in area where embankment fill will be placed)?	n/a		From underdrain?	see	note
9. Trees growing on embankment? (If so, indicate largest diameter below)		x	At isolated points on embankment slopes?	see	note
10. Cracks or scarps on crest?		x	At natural hillside in the embankment area?	n/a	
11. Is there significant settlement along the crest?		x	Over widespread areas?	see	note
12. Are decant trashracks clear and in place?	n/a		From downstream foundation area?	n/a	
13. Depressions or sinkholes in tailings surface or whirlpool in the pool area?	n/a		"Boils" beneath stream or ponded water?		x
14. Clogged spillways, groin or diversion ditches?		x	Around the outside of the decant pipe?		x
15. Are spillway or ditch linings deteriorated?		x	22. Surface movements in valley bottom or on hillside?		x
16. Are outlets of decant or underdrains blocked?		x	23. Water against downstream toe?		x
17. Cracks or scarps on slopes?		x	24. Were Photos taken during the dam inspection?	x	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue # Comments n/a = Not Available/Applicable

1 Company does not have a formal inspection program or schedule with documented periodic observations.

2 Pond No. 10 is currently out of service and drained, with about 2/3 of the ash partially excavated for landfilling. The water in the pond is primarily from runoff and is at the pond bottom, below the spillway invert.

16 Pond No. 10 outlets through HDPE outlet pipe around Pond No. 3a into channel on north side of Pond No. 6.

21 Perforated pipes that outlet into drainage swales at the dike were active, likely intercepting surface water that infiltrated dike from the rain during the site assessment. Slope seepage is not likely because the pond is empty; rain at the time the dike was observed would have likely obscured readily observable seep areas.

U. S. Environmental Protection Agency

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # OH0004316 INSPECTOR Hargraves/Filkins

Date October 27, 2009

Impoundment Name JM Stuart Station Ash Pond No. 10

Impoundment Company Dayton Power and Light

EPA Region 5

State Agency (Field Office) Addresss Ohio EPA Southeast District Office
2195 Front Street; Logan, Ohio 43138-8687

Name of Impoundment JM Stuart Station Ash Pond No. 10

(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New _____ Update x

	Yes	No
Is impoundment currently under construction?	_____	x
Is water or ccw currently being pumped into the impoundment?	_____	x

IMPOUNDMENT FUNCTION: Fly Ash disposal

Nearest Downstream Town : Name Maysville, Kentucky

Distance from the impoundment 3.2 miles

Impoundment Location:

Longitude 83 Degrees 41 Minutes 6 Seconds

Latitude 38 Degrees 38 Minutes 22 Seconds

State Ohio County Adams

Does a state agency regulate this impoundment? YES x NO _____

If So Which State Agency? ODNR - Division of Water

HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

_____ **LESS THAN LOW HAZARD POTENTIAL:** Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

_____ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

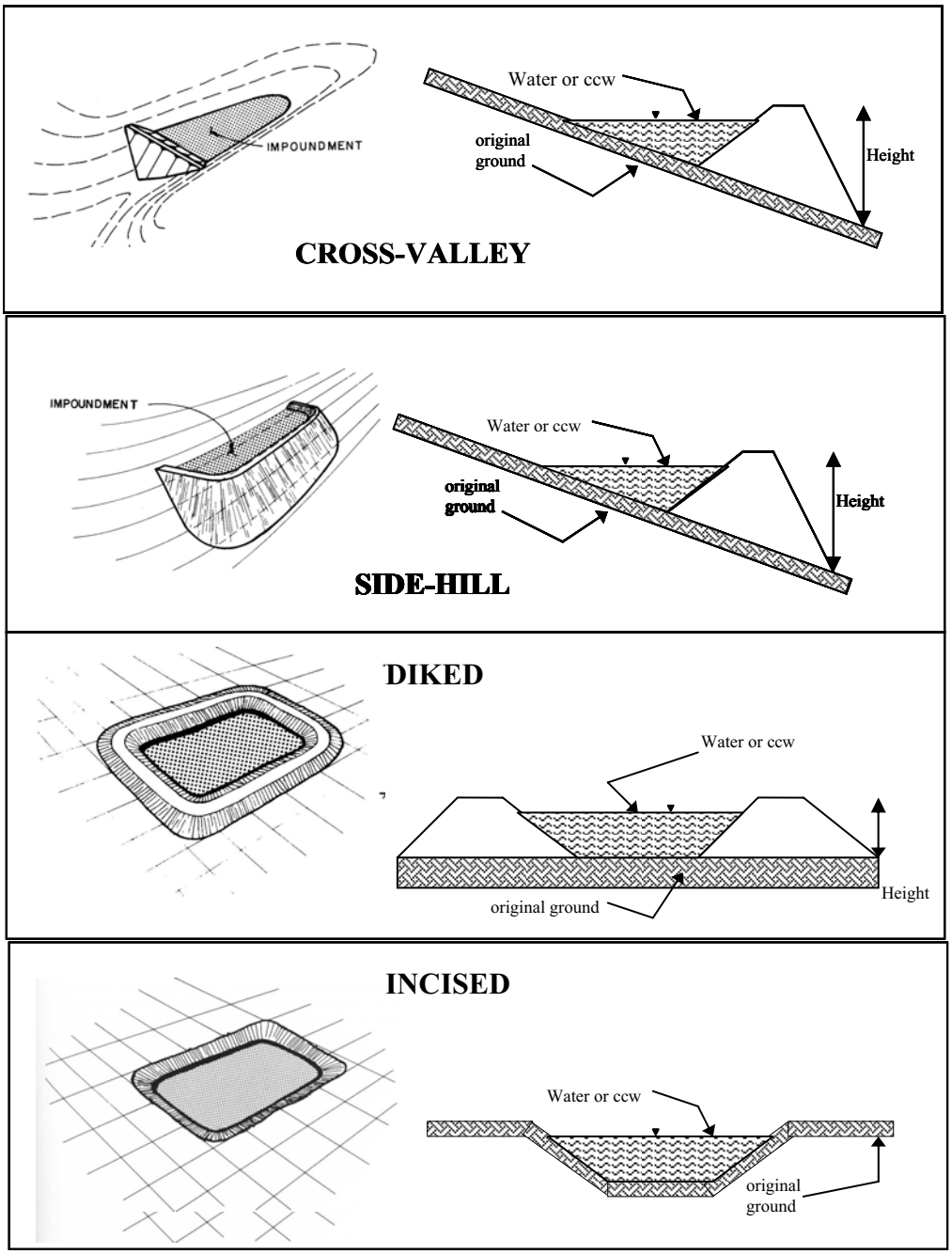
x_____ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

_____ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

In the event of a failure the breach wave would impact plant access drives, the facility substation, storage, and parking areas. US 52 to the north of the impoundment and a tributary to the Ohio River could also be impacted.

CONFIGURATION:



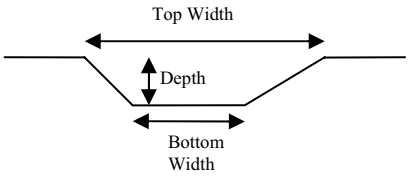
_____ Cross-Valley
_____ Side-Hill
_____ Diked
_____ Incised (form completion optional)
x____ Combination Incised/Diked

Embankment Height 24 feet
Pool Area 29 acres
Current Freeboard 24+ feet
Embankment Material Earth fill, Zoned
Liner none
Liner Permeability n/a

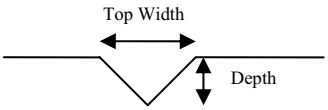
TYPE OF OUTLET (Mark all that apply)

n/a **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Rectangular
_____ Irregular

TRAPEZOIDAL

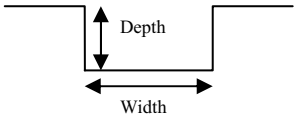


TRIANGULAR

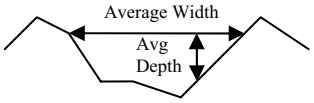


_____ depth
_____ bottom (or average) width
_____ top width

RECTANGULAR

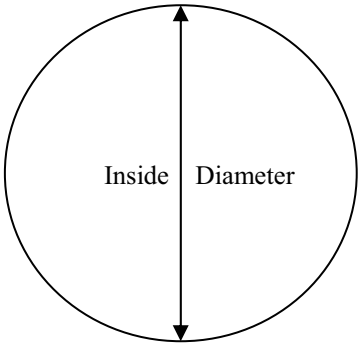


IRREGULAR



x **Outlet**

30" inside diameter



Material
_____ corrugated metal
_____ welded steel
_____ concrete
x plastic (hdpe, pvc, etc.)
_____ other (specify) _____

Is water flowing through the outlet? YES _____ NO x

_____ **No Outlet**

_____ **Other Type of Outlet** (specify) _____

The Impoundment was Designed By URS Corporation

Has there ever been a failure at this site? YES _____ NO x_____

If So When? _____

If So Please Describe :

Has there ever been significant seepages at this site? YES _____ NO x_____

If So When? _____

IF So Please Describe:

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES _____NO x_____

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